SCIENCE AND REVOLUTION

By ERNEST UNTERMAN

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SCIENCE AND REVOLUTION

I. Proletarian Science

Human history is not only economic history, but also natural history. The economic history itself would not be possible without the foundation which is the special domain of natural history. The study of human evolution, therefore, requires an analysis of the biological development of mankind as well as of its economic development. From this point of view, man's development in society and his general position in the universe appear as parts of the entire world-process.

My method of investigation is that of historical materialism. Just as in the study of economics and politics we trace certain ideas, and their application in practice, back to economic facts, so in biology we trace certain ideas back to the material facts of the earth and of the rest of the universe. In this way, we obtain a universal key to the entire intellectual activity of

mankind, and a sound basis for the solution of all the riddles of the universe.

I speak as a proletarian and a socialist. I make no pretense to be a scientist without class affiliation. There has never been any science which was not made possible, and which was not influenced, by the economic and class environment of the various scientists. I am, indeed, aware of the fact, that there are certain general facts in all sciences which apply to all mankind regardless of classes. But I am also aware of the other fact, that the concrete application of any general scientific truth to different historical conditions and men varies considerably, because abstract truths have a general applicability only under abstract conditions, but are more or less modified in the contact with concrete environments. I make this statement in order to anticipate the criticism that there can be no special science for the proletariat different from any other science. Of course, a proposition in Euclid is true, whether demonstrated by a proletarian or by a capitalist. But it is true in theory and in practice only so long as the practical application of the general conclusion of any Euclid proposition does not interfere with the interests of the ruling class. If it did and a

proletarian mathematician were to argue that what is true for the capitalist class must also be true for the working class, the capitalist class would speedily reply that it was not at all a question of abstract truth, but of concrete power to demonstrate this truth.

Moreover, I am also aware that all my ideas are the products of my past and present environment. I cannot speak, therefore, without showing in all I say, that I am a member of the class-conscious proletariat, a member of that part of the proletariat which has escaped from the spell of capitalistic thought. I realize that a science, however true may be its theoretical conclusions, does not exist for that part of mankind who cannot apply its abstract truths in their practical life. The proletariat has no science unless science steps into its ranks or develops out of its very life, for the purpose of combining scientific theory with proletarian practice.

In this sense, then, I declare that my science is a proletarian science. Not that I do not appreciate what the bourgeois scientists of the past have accomplished, or what the bourgeois scientists of to-day are doing in the way of accumulating material for the storehouse of human knowledge. But proletarian science is the expression

of the revolutionary fact that the proletariat has learned to think for itself, that it refuses to accept the teachings of members of other classes without critical reservation, that it prefers to think for itself in all other sciences as it does in economics and politics, that it interprets the facts of its terrestrial and cosmic environment as it sees them from its own standpoint.

Proletarian science is the Declaration of Independence of the proletarian mind from the control of the capitalist mind. And since the proletariat is historically the most revolutionary class in society, and the future man in embryo, proletarian science is the most revolutionary science and the embryo of the future world philosophy. If this science finds that its conclusions agree with those of the bourgeois scientists so much the better for their science. If the two do not agree, then let the best science win.

Since economic activity is based on biological necessities — primarily food, clothing, and shelter — we must understand biological facts as well as sociological ones in order to obtain a full understanding of our nature and development. Bourgeois statistics tacitly acknowledge this by dwelling on biological facts, such as births, marriages, diseases, deaths, crime, prostitution. But

bourgeois scientists conveniently overlook the revolutionary suggestions which come from their tacit combination of sociology and biology.

The proletarian scientist, on the other hand, recognizes the vital connection between economic and biological facts. He understands that the very consciousness of his own class interests, and of the historical mission of the proletariat, is not only a sociological, but also a biological problem, and that his proletarian environment molds his physical qualities and brain processes differently from those of a prosperous and well-fed bourgeois living in a beautiful home and standing aloof from the uncouth impressions of a slum environment.

It is important to emphasize this, because attempts have been made by certain bourgeois scientists to justify the existence of different economic classes, and the rule of privileged masters, on the ground of biological evolution. But the formation of economic classes is not a biological necessity. It results originally from economic changes. The economic advantages then produce biological advantages, and the interaction of these movements then continues to favor the economically ruling class, up to the time when excessive wealth leads to the atrophy of essential organs

and functions, partly from disuse, partly from physical excesses.

In order to present the subject as a part of the entire world-process, and constantly keep in mind the universal application of our method, I shall discuss everything under the aspect of environment. We then see that the world-process consists in a struggle of various parts of the universe against one another, and in the gradual ascendency of certain parts over all the other parts of their environment. And since man is to us the most important part, we shall observe HIM in his struggle for the control of his environment.

* * * * *

II. The Starting Point

Let us start from a secure foundation by defining our terms, before entering into a discussion of man's conquest of his environment.

What do I mean by man? What do I mean by man's environment? In attempting to answer these questions, we must have a definite point of departure. The navigator who heads his vessel for the open sea, traces his first course on his

chart from some lighthouse, cape, or other prominent and well-known point, the exact latitude and longitude of which are known. We, too, are setting out on a voyage into the open sea, the sea of unknown ideas. Where is the first point from which we can take our departure?

Man is body, mind and soul, so we are told by those who claim to have received this revelation direct by wireless message from the unknown. But if we are trying to locate the exact bearings of either mind or soul, we soon discover that the experts disagree about the latitude and longitude of these two points. However it is generally admitted that the brain, the organ of the intellect, is their headquarters.

The human brain, then, is our point of departure. It is tangible and its location is fixed. About its internal processes, we need not trouble ourselves for the present, any more than the navigator requires a knowledge of the internal nature of the lighthouse from which he marks his first course. The brain and its location are definitely known quantities, definite enough to make good points of departure for our inquiry.

We know that this brain is a part of man's anatomy. It has for its immediate environment all the other parts of the body. It is, for instance,

directly connected with the central nerve system, and through this system with the heart, the lungs, the liver, the stomach, with the muscles, the connective tissue, the bony skeleton, etc. The physical brain, and the other physical parts of the human body, constitute the individual man with whom I am here dealing. And this individual, and all his fellow-men, are the collective man whose conquest of his environment I undertake to study. Only this natural man and no other.

Now, what is the environment which this natural man is to conquer? In explaining this I must mention a few things which may seem trivial. But there is nothing that is trivial in this study except the things which science cannot grasp by inductive and analytical methods. The most trivial things in the environment of man have a greater influence than most of us realize.

Man's environment, then, consists of the clothes that cover his skin. The house in which he lives and its furniture and fittings. The food that sustains him. The other men, women and children that live around him. Further, the village, town, or city, where his house stands, and all the inhabitants and their houses in the same locality. Then the county, state, nation, with their entire

population, their social organization, their mode of production, their historical conditions. Furthermore, the air which man requires for breathing, the climatic conditions of his locality, the soil, grass, flowers, trees, animals, springs, lakes, rivers, seas, mountains, not only those near him, but on the entire surface of the globe; the cosmic conditions immediately surrounding this globe; when the moon, the planets, the sun, the fixed stars, the Milky Way, the comets, and all the rest of the universe, whether he perceives it or not. All these things, always considered as natural things, form the environment of the physical brain.

On the other hand, my brain is a part of the environment of any or all these things. Each part belongs to the environment of all the other parts of the universe, and neither would be just what it is without all the others.

But, some one may say, mind and soul and all the rest of the unknown things of the world are also parts of the universal environment of our brain. True, even if mind and soul were but imaginary terms, they would still be parts of our brain's environment. But so are the unknown quantities x, y and z parts of the environment of the known quantities of some algebraic

formula. And in attempting to find the value of the unknown quantities of any algebraic formula I must rely on the known quantities for a solution of the problem. And frequently it is found in the process of the solution that one or all of the unknown quantities are equal to zero. It is not at all improbable that in solving the equation of man and his environment I may find that the so-called mind and soul, as currently conceived, spell zero.

At all events, in the attempt of solving my equation of man and his environment I must operate with the quantities which are known. And if I use the terms mind and soul occasionally I refer to them simply as brain activities, identical so far as our discussion is concerned with any other brain activity connected with thought. Whether mind and soul are anything else but brain activities we shall be better able to tell at the end of our journey.

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III. The Awakening of Philosophy

With man's material brain for a starting point we now set out on our discussion of the evolution of theories of evolution.

Three great riddles have from time immemorial puzzled this brain. These riddles are the origin of the universe, the origin of life, and the origin of man. And the solution of these riddles is supposed to answer the questions: What will be the fate of the universe? What part is death playing in relation to life? Does individual life imply individual immortality? And the efforts made in the ages past to solve these problems constitute the essence of all theories of evolution.

Evolution means development. It is frequently understood to signify only development in a forward direction, progressive advance in a straight line. But the movement of universal evolution does not proceed by uninterrupted forward steps of all forms of matter. It is rather made up of advance and retreat. At any stage of the world-process, certain parts of the universe are on the upward grade of their career, while others are on the downward grade. But out of the general interaction of the sum of forward and backward movements, there seems to develop a gradual supremacy of one part of the universe over another, so that things which were the controlling element at one epoch are gradually superseded by others, until the concentration of the control of the entire process by one factor changes the

anarchic interaction of apparently aimless elements into a consciously directed and organized movement toward a preconceived aim.

This interaction of two movements, of progress and reaction, pervades every particle of the universe. It is going on in conglomerations of masses as well as in the most minute particle. Is it a wonder, then, that the same fluctuations are also observed in the ideas of mankind, as we find them registered in the pages of history?

Birth, growth, decay, and death, are the great stages in the existence of all things of this world. This observation was the basis for the early ideas on transformation. But these ideas were vague and crude, as vague as the natural history and as crude as the tools of early man. A glance at the maps of ancient Grecian and Roman geographers shows that their knowledge of the surface of this globe was very limited. Astronomy was then still in its swaddling clothes. Its scientific instruments consisted of sand glasses, astrolabes, sun dials, and the like. General education did not exist. Means of communication and transportation were in an embryonic state. The intercourse between nations through navigation and commerce was never very extensive, even at the most flourishing period of ancient history, com-

pared to modern standards. Men, animals, and plants, and their products, seemed to be the only things of a passing nature, while all other things seemed imperishable and eternal.

At this stage, the three great world problems could be answered only in a speculative way. Positive facts bearing on them had not yet been collected. And since man's thoughts were naturally centered on himself, nothing was more logical than that he should consider his temporal abode, the earth, as the center of the universe and himself as the center of all life. This earth was to him a flat disc, bounded on the West by the Pillars of Hercules (the Straits of Gibraltar), and later, with the extension of Phœnician commerce and the Roman empire, by the Atlantic Ocean; in the East by the fabulous Cathay (India), which was supposed to extend no farther than about the 75th degree of longitude east of Greenwich; on the North by the 55th degree of latitude; on the South by the Sahara desert. What lay beyond these boundaries was never heard of, except in fables and legends. To this primitive knowledge of the earth's surface corresponded the Ptolemaic system of the world, conceived toward the end of the Grecian period by Ptolemy of Alexandria. The heavens, according

to the current conceptions before him, were placed over the disc of the earth like a section of a hollow globe. The stars were fixed to this globe, or were steered across it by heavenly pilots, as were the sun and the moon. The origin of life and of the universe was darkly hinted at in mysterious legends or religious phantasies. The Grecian legends of gods and demi-gods, as well as the Buddhist legends, and later the German and Norse legends, reflect this stage of human philosophy. Man was dominated by mysterious forces, and his fate after death was as mysterious as the unknown forces themselves. Whatever men could not explain in their environment, they translated into objects of worship and awe. Ptolemy attempted a scientific solution of astronomical problems in his "Syntaxis, A Treatise on the Mathematical Construction of the Heavens." He did remarkable work for his time, the period following the death of Alexander the Great. But historical conditions were against him, and he did not emancipate himself from the idea that the earth was the center of the universe and man the central object of all creation.

When familiarity with iron, bronze, and wood work led to a perfection of tools and to a greater division of labor, when the ancient gentile groups

with their simple blood relationships were undermined by these economic changes, when local division and property distinctions appeared in the place of the fraternal relations of the former members of a tribe, when the means of life became abundant and a class of leisure freemen thrived on the shoulders of a working population composed of slaves, then the study of world problems entered a new stage. The evolution of the tools profoundly influenced the evolution of man's ideas, in those primordial days as well as ever after.

We then find growing up, simultaneously with the gradual disintegration of the old faiths, schools of thinkers who base their ideas on a closer observation of tangible facts. The correctness of the current conception of the world is then doubted. With the growing tendency to solve the riddles of the universe by inductive methods and experienced facts, there also develops a critique of human relationships, a probing into the meaning of right and wrong, good and bad. When polytheism becomes pantheism, materialism meets idealism on the field of thought. And this growing materialism is but the first faint reflex of a class struggle in ancient society. And all philosophies of the world, no

less than all sciences, have ever worn the imprint of this struggle. It is seen in the writings of Confucius. It cries out from the mouths of the Jewish prophets. And it has left its mark on the philosophies of ancient Greece and Rome.

* * * * *

IV. A Step Forward in Greece

In ancient Greece, it is the time from about 750 to 450 B. C., which gives expression in philosophy to the transition from primitive society to early class rule. And among the materialist philosophers of those 300 years of primitive Grecian history, none are more interesting for the modern proletarian than Anaximander, Heraklitos, and Empedokles.

These philosophers were the first among ancient Greeks to seek for a natural explanation of the universe. Their philosophy was a natural philosophy and was logically limited by the scientific knowledge of their period. This knowledge, in its turn, was limited by the development of the tools and the corresponding process of production. With the tools of that period, and with slave labor for a basis of society, natural philoso-

phy quickly found that its powers of perception were very limited. Hence none of the early Grecian philosophers could offer any other solution of the world problems than very daring hypotheses. It is characteristic of all these thinkers that they complain about the untrustworthiness of human sense perceptions.

Anaximander assumed that innumerable world bodies developed by the rotation of matter and by condensation of gaseous substances. The earth, according to him, came into existence in the same way. Thus he anticipated the nebular theory of Kant, who 2,400 years later, in 1755 A. D., published his " Natural History and Theory of Heaven." And Anaximander is not only the prophet of Kant and Laplace in cosmogony. We also find him hinting at biological ideas, which were later developed by Lamarck and Darwin. He asserts, for instance, that the first living beings of the earth were produced by the influence of the sun on water, and that animals and plants gradually evolved out of those primitive living forms. Man, according to him, developed out of fish-like animals.

About 100 years after Anaximander, similar thoughts were expressed by Heraklitos. He claimed that a continuous process of development

pervaded the entire universe; that all forms were in constant flow, and that "struggle is the father of all things," thus expressing the idea of Darwin in regard to a struggle for existence.

A little later, Empedokles developed these ideas still more. In his didactic poem, he sings: "Long, long ago, whether boy or girl, I may have been in a flower, a bird, or a fish . . ." Hate and love were to him the two active principles which determined the evolution of all things. This is an embryonic conception of the subsequent theory of atomic interaction by attraction and repulsion. And it is remarkable that Empedokles believed in a development of all forms by purposeless interaction and thus indicated the problem, which Darwin solved in his "Origin of Species," the problem: How can purposeful forms arise mechanically without the control of some universal guiding mind?

With the victorious conclusion of the Persian wars, the industries and wealth of Athens grew apace. With them grew also the distinction of classes and the intensity of the class struggles. The small property owners, representing the principles of "Democracy" (only among freemen, however), opposed the aristocratic tendencies of the wealthier freemen. And these struggles are

reflected in the ideas of the thinkers following those early natural philosophers, more especially in those of Demokritos, Epicurus, and their reactionary opponents, Socrates, Plato, and Aristotle.

In the ideas of Demokritos, the influence of the early materialist philosophers is still plainly visible. According to him, nothing exists but atoms and empty space. The atoms are infinite in number and in form. They are in constant motion, falling through space the faster the larger they are. In their fall, the larger atoms strike the smaller ones. These are thrown aside by the force of the contact and continue in their whirling motion, thus forming the beginning of the first globes by gathering other atoms in their revolutions. The atoms, according to Demokritos, do not experience any internal changes. They react upon one another only by pressure or shock. The soul of man is composed of fine, smooth atoms, similar to those of fire. These atoms penetrate the whole human body and produce the phenomena of life.

The theories of Demokritos contain in the germ all the fundamental principles of modern materialism. And just as he represented the evolutionary element in the society of Athens, so in

later historical periods the revolutionary elements of society have always found in materialist science their strongest weapons, while reaction has ever relied upon idealist and metaphysical philosophies. And be it said at this point: It is not at all necessary that the individual idealist or metaphysical philosopher should have consciously aimed at reactionary political results by means of his philosophy. The mere presence of idealist and metaphysical ideas suffices to make them useful in the interest of reaction, whether the philosopher intends it or not.

Socrates, for instance, who developed out of the ranks of the sophists and opened the attack on them when the aristocratic counter-revolution in Athens grew apace, was not conscious of the fact that he was attacking the intellectual props of democracy by attacking the humanitarian and natural philosophy of the sophists. And while in his teachings, he ostensibly sought to reform the moral life of his country-men by *true* science, he was in reality, by means of his metaphysical conception of science, furnishing the aristocratic reaction with its intellectual weapons against the empirical science of Athenian democracy. But neither Socrates nor the sophists could get out of the vicious circle of their ideas, because both

Athenian democracy and its aristocratic enemy were based on slave labor and sought to derive absolute concepts, true for all time, out of relative conditions which were based on a fundamentally unethical principle, slavery. The internal contradictions of this economic structure of democracy and aristocracy in Athens caused the downfall of both of them, and with them fell also the philosophies of their times.

So much is evident from the testimony of history: Whenever any proletarian movement attempted to steal the reactionary thunder of supernatural philosophies or religions, as the early Christian movement seems to have done, it fell so much the quicker under the blows of reaction, for it carried within itself the historical weakness of the ruling class mind. On the other hand, a rising class other than proletarian that takes recourse to materialism in its political struggle against a declining ruling class quickly drops materialism and espouses idealism, when materialisms threatens to further the interests of the proletarian revolution. This is true, for instance, of the modern capitalist class. At the beginning of its struggle against feudal rule, it was compelled, by the historical connection of the medieval church with feudalism, and by the requirements

of its own commercial interests, to call in the help of empirical science and materialist philosophy. But now that this same philosophy is becoming the weapon of the rising proletariat, capitalism once more allies itself with metaphysical philosophy and mystic religion. Materialism is the handmaid of revolution, and without it no proletarian movement complies with the historical requirements of its evolution.

The reactionary character of the anti-sophist philosophies became very plain in the further evolution of the followers of Socrates. While the Cynics and Cyreneans strayed into practical ethics and neglected the speculative side of the Socratic philosophy, Plato, and later on Aristotle, gave to this philosophy its typical character of speculative metaphysics. This philosophy marks the complete downfall of Athenian democracy, the failure of the early attempts at a materialist monism, and the temporary victory of the metaphysical conception of mind and of idealist dualism over empirical science. And the reactionary character of Plato's philosophy is stamped on every page of his utopian "Republic," which he intended to realize by the help of foreign tyrants without asking for the co-operation of his fellow-citizens. The political pupils of Socrates

went the whole length of their reactionary logic, and names like those of Xenophon and Alkibiades were execrated by the Athenian democracy, because their bearers allied themselves with feudal Sparta against the onward march of democratic industrialism.

Aristotle, in his works on natural history, was led back to nature. This contact with natural things compelled him to recognize, in his philosophy, the interaction of mind and matter. Therefore he sought to reconstruct the dualism of Plato, who had placed mind entirely outside of matter, by making mind the superior and essential principle of matter. In thus combining natural science and speculative philosophy Aristotle became the *beau ideal* of all subsequent apostles of reaction, who are compelled, by the onward march of empirical science, to adjust their metaphysical beliefs to the facts of experience. The Platonic-Aristotlean philosophy, by its pseudo-scientific character, became the pet of the Constantinian reaction against proletarian Christianity and the legitimate boon companion of the scholastic thinkers of medieval feudalism.

With Epicurus, materialist monism made one last great effort to rehabilitate itself in the Grecian world. But at his period, this world was

already in the final stages of disintegration, as a result of the conquests of Alexander the Great. Epicurus tried to represent the mind as a part of the atomic world, as a tangible object. Here we also find a first faint attempt to check the crude fatalism and predestinarian logic of Demokritos by giving to this materialist mind a limited scope of free will through the admission of the possibility of accident. While Demokritos believed in merely two primitive movements of his atoms, a falling and a rebounding motion, Epicurus introduced the idea of a deviation of the atoms from the straight line. But his philosophy, as well as that of all his predecessors, suffered from the insufficiency of empirical data for the substantiation of his theories. And with the dissolution of Grecian civilization, Grecian philosophy fell into the hands of men representing other classes and other environments. The result was an adaptation of Grecian philosophy to the requirements of these new men and conditions.

* * * * *

V. A Step Backward in Rome

While Grecian philosophy had been climbing to the peaks of its greatness, Rome had been

struggling for the control of the Italian peninsula. And now, when Ptolemy Philadelphus continued to build upon the foundations of literature, science, and art, laid by his talented predecessor in Egypt, Rome began its wars of expansion by a first onslaught upon Carthage. Always engaged in internal and external struggles, the rulers of Rome had been compelled to give more attention to the practical side of life than to the speculative. In the further development of the Roman world, internal class struggles and external wars of conquest continued to tax the resources of the Romans for the maintenance of the military power, and it was not until a much later time that a class of such wealth as that of classic Greece gave breathing space to literature and art.

At the time when Grecian philosophy found its patrons among the Ptolemies, the mental life of the Romans had not yet risen above the level of the Homeric stage of early Greece. And when Rome finally arrived at that period of its career where philosophy could become acclimatized in a Roman atmosphere, that is to say, about the middle of the century preceding the dawn of Christianity, Grecian philosophy completely dominated the ideas of all advanced thinkers. Moreover, this philosophy corresponded so fully to the re-

quirements of the Roman empire, that it was simply adopted ready-made. But it was by no means improved upon. For the thinkers of Rome little understood the historical conditions out of which this philosophy had been evolved. The works of men like Lucretius and Cicero were either dreamy reflections of the scientific systems of their Grecian masters, or muddled by the instincts of the social class to which the philosophers of Rome belonged.

The Roman world never arrived at an independent philosophy. No sooner had the Roman emperors taken their seats, than they were called upon to put down rebellions at home and abroad, and to devote the resources of their empire to the maintenance of huge armies. Under these circumstances, science had to give precedence to epics and historical works. Philosophy lived on as a Grecian product. And in proportion as the Roman world disintegrated under the baneful effects of unprofitable slave labor and barbarian attacks, it created an environment in which the warrior survived over the thinker. The mental life of the masses, which had at no time risen above the barbarian level, dragged along in this deep furrow, and the more the dissolution of the Roman empire proceeded, the farther did the in-

tellectual pendulum swing back towards mysticism and idealism.

Philosophy as a science, in its garbled Ciceronian form, now withstood less than ever the pressure exerted against it by priestcraft and retrogressive obstinacy. Even in the East, where its cradle had been, and where its pulse had always been strongest, it gradually lost all attributes of science and was trampled under the heels of reaction. All pillars of mental evolution gave way, the Grecian and Roman gods lay prostrate, and the obscurity of pre-Grecian stages settled down upon rich and poor alike.

Among the ruling classes, brutal cynicism and anarchist scepticism spread apace. Their education was just far enough advanced to enable them to sneer at heaven and hell. But the masses, untaught and superstitious, could not part with the consolation of mystical beliefs. Everything paved the way for the ascendency of some new god who should be more powerful than any of the disavowed gods.

As soon as the historical stage had been set for the enactment of this new scene, the actors began to play their parts. Of all the religions then existing, none was better fitted to fulfill the requirements of this historical situation than the Jewish.

It had clung steadfastly to its one god, ever since Abraham emigrated from Chaldea to avoid idolatry. It had withstood exile, war, and persecution. The Jewish god had but to be dressed up in a garb acceptable to all nationalities that now mingled in the Roman provinces and in Rome itself. And he needed but an international force that would raise him to the position of its chosen patron. This force was ready at hand. It was the proletariat, composed of freed slaves and impoverished freemen. An international language also existed. It was a mongrel Latin, with which everybody was more or less familiar.

There was a very good reason why this proletariat should rally to the support of some international religion. At various times, and at widely separated places, attempts had been made to overthrow the ruling classes by force of arms. These attempts met with the same fate that has since befallen all similar revolts which were undertaken before the conditions for their success had matured. They were drowned in seas of blood. And the most Draconic laws forbade any organization which was not officered by the overseers of the ruling classes. Political action was likewise out of the question, for the same reasons.

Religion was the only hope of the proletariat. It offered the only possibility of organization which the ruling class would not suppress, nay, which it would promote for the same reasons that rulers have ever had for preserving religion, viz., because it is an excellent means of dividing the working classes and of strengthening belief in authority.

It was but logical, therefore, that this new religion should first appear in Palestine, and that it should try to justify itself from the ancient records, which had once been the common heritage of all members of the twelve tribes. The carpenter of Nazareth and his followers had but to step into the shoes of the ancient tribal prophets in order to get a hearing among the workers. The very arguments that once served in the mouths of the old prophets against the usurpation of the tribal chiefs, or kings, sounded familiar in the mouths of the new prophets when used against the rulers of Christ's time.

So the new paganism tried to drive out the devil by the help of Satan. Christianity entered history as the first conscious attempt of an international proletariat to hide its revolutionary aims under the cloak of a religion adapted to its mental requirements.

It spread like wildfire among the proletariat of the entire Roman empire, for the soil had been well prepared for it by the historical conditions. Christ is reported to have been crucified about the year 33. About thirty years later, Nero burned Rome in order to set loose the fury of the Roman plebs against the Christians, who were permeating the entire fabric of the Roman world. But religion is a double-edged sword and cannot be overcome by any persecutions. The Roman emperors had ample opportunity to learn this during the next 300 years. In spite of all persecutions, Christianity worked its way into the very heart of Roman society and into the remotest provinces. It thrived on persecution. At last the ruling class discovered that it had neglected its best weapon when it failed to identify itself with this new religious movement. Religion can be overcome only by two things: Either by another religion, or by science. But the ruling class had neither science nor any other religion to oppose to this new creed. In 312, six years after the advent of Constantine to the throne, matters had reached such a climax that there remained only one alternative to the ruling class: Either to succumb between the invading hordes of Goths,

Franks, Allemanni, revolts in the provinces, and the Christian proletariat, or to divide and rule.

Naturally, Constantine grasped this last straw. Thanks to 300 years of evolution under the Roman constitution, which was but the political mirror of the then existing mode of production, economic distinctions and religious schisms had arisen among the Christians. The primitive communist practices had become distasteful to many Christians who had acquired property enough to feel more kin to the pagan rulers than to their proletarian brethren. Under the influence of their material interests, these wealthy Christians were only too prone to enter into a protective alliance with the pagan powers against the proletariat of any and all creeds. The rulers, on the other hand, had reached the stage, where their only safety lay in the domination of the Christian movement by the help of the wealthy Christians. Under these circumstances, we see here a phenomenon, which became quite common later on, and which we noticed once before in Greece: When scepticism, or materialism, became useless for the ruling class, and a hitherto persecuted philosophy or religion useful, the rulers changed their religion as easily as if it were a shirt. The same tendency is once more apparent in our own

time, where formerly protestant or atheist rulers are showing an ever more pronounced willingness to enter the fold of the catholic church in exchange for the services of this church against the rising revolution of the modern proletariat.

Whenever the rulers are ready for this step, some great miracle happens. About 1,600 years before Constantine, Moses had suddenly seen a great light in the bush. He saw it several times later, when new property relations demanded imperatively a transformation of the persistent tribal customs into "laws" more in keeping with the interests of the hierarchy. He had not been in close touch with the Egyptian princes and their priestcraft without learning from them. Now it was Constantine's turn to see a great light. Saul had seen the same thing before he became Paul, only for a different purpose. The new Saul became, not a Paul, but a Judas, and the Judases in the Christian movement were lavishly rewarded by him with grants of land and money. The farce was inscribed *"In hoc signo vinces,"* and presto, the Christian religion became the church of the ruling class. The Christian proletariat had played with fire and got burned. But it was the best they could do under the prevailing historical conditions. They repeated the same mistake

many times after, and they will repeat it, until they learn to use a weapon which no ruling class can wrest from their hands,— proletarian science.

In vain did the proletariat strive to overcome ruling class religion by proletarian religion. No sooner did the ruling class make the Christian religion its own, than its struggling parties took sides in the religious schisms of the Christians, and used them as means for their own dynastic ends. The adoption of the Nicene creed at the council of Nicæa in 325, and the condemnation of Arius who opposed the mystical additions of Athanasius to the primitive Christian creed, marked the complete control of the church organization by the ruling class. And when Julian the Apostate championed the Arian creed in the attempt to hold his position against the intrigues of the Athanasian diplomats, he made the same experience which the Christian proletariat had made before him. In a mystic religion, mysticism always holds the best trumps. The council at Constantinople, in 381, marked another step in the direction of mysticism, and in the following struggles for and against image worship, it was again the reactionary tendencies which won the day.

We need not go into the details of the evolution of Christianity at this stage. Suffice it to say that henceforth it was lost to the proletariat as a weapon in its struggles against the ruling classes, and has ever since proven itself a bulwark of retrogressive counter-revolutions.

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VI. In the Slough of Ecclesiastic Feudalism

No sooner had the church of the ruling Christians become the Roman state, than the "souls" of men were "saved" by suppressing their free intellectual development. Science was tied hand and foot. The strictest regulations were issued, forbidding practices which were then almost the only means of inductive research, such as the anatomical study of human corpses. This was still vetoed by the church in the 15th century. In ancient Greece, natural philosophy owed most of its inductive facts to physicians. Under the rule of the Roman Christians, physicians were practically compelled to take up metaphysics, if they cared at all for philosophical research. Science fell almost entirely into the hands of the priests.

It was but natural, that Platonic-Aristotlean philosophy should become the favorite of these religious thinkers, and that under their influence, astronomy should assume the form of astrology, and chemistry that of alchemy.

Nor were economic and political conditions favorable to the inductive modes of scientific research. In the first place, the Huns began their westward and southward march in 374, two years after Ulfila had translated the Bible into Gothic. And in 410, five years after the completion of the VULGATE by Jerome, the Visigoths pillaged Rome. The Huns were beaten on the Catalaunian fields in 415, but in 455, the Vandals paid a visit to Rome. The struggle between the East-Roman and West-Roman empires, the continued invasions of barbarians from the North, of the Arabs from the East, kept Europe in a state of restless ferment. And this condition of things continued from century to century, so long as feudalism, the successor of Roman slavery, endured. Later we have the Moors in the South, the Turks in the East, the Norsemen in the North; the crusades, beginning in 1,095; the raids made in the interest of the Mediterranean merchant towns against the Turks. All these disturbances discouraged education at the ex-

pense of warrior's virtues. Even late in the middle ages, most of the "noble" heroes were content to leave the despised art of letters to monks and physically weak bookworms.

On the economic field, production lagged along in its feudal slowness, without stimulating the invention of labor-saving machinery, of improved methods of cultivation, or of scientific instruments and processes. Alchemy and astrology occasionally stumbled across some great discovery, but did not know what to do with it when they found it. The stone of the wise, the elixir of life, the making of gold by laboratory methods, the idea that phlogiston, or fire-air, was the cause of fire, these and similar things mark the scientific methods on which the philosophy of the middle ages based its speculations, which never dared to deviate very far from the religious dogma.

Communication and travel were very difficult and dangerous. Marco Polo, in 1271, was the first great traveler who sought to popularize the results of his travels. Enlightenment inevitably took a religious disguise, as before. This is evident, for instance, in the anti-papal movement of Arnold of Brescia in the middle of the 12th century, and in the struggle of the humanists against the obscurantists in the 15th and 16th

centuries. But whatever may have been discovered by inductive methods in the secrecy of the investigator's cell, the outside world never heard about it. Excommunication, the stake, the dungeon, poison and dagger, were always held in readiness by the rulers, and their spiritual advisers, for any daring thinker who might have ventured forth with any startling discovery in natural science. The horrors of bloodshed on every hand were intensified by the burning of "heretics," and to make the terror complete, the "Black Plague" swept across Europe about the middle of the 14th century.

But evolution, though denied official recognition, went its fateful way. Very soon, the church itself felt the giant hand of social progress clutching at its heart.

The church, instead of building its foundation on the Rock of Ages, had built on a far less "eternal" ground, viz., on the exploitation of feudal serfs. Now this foundation had been gradually undermined since the 13th century. More than once, the feudal serfs had stirred restlessly under the heavy yoke of the feudal church. In Great Britain, they had rallied around John Ball and Wat Tyler, about the last quarter of the 14th century, and threatened the rule of the church.

On the continent, the wars against the Turks had kept the class struggle more under cover. But along with the decline of the worldly power of the church, there had come a mighty growth of commercial cities. These had taken part in the movements against the oriental rulers who were cutting western commerce off from the resources of India and Persia. Since the 11th century, the Mediterranean cities had tried to capture the eastern ports, such as Alexandria, Jaffa, Tyre, Constantinople, and to control the land routes to India across Asia Minor. But the capture of Constantinople by the Turks in 1453 settled the question of the control of these ports and routes in favor of the Turks.

Cut off from the land route to the East, the trading class naturally turned their thoughts to the open sea in the West. The religious fervor of the crusades had gradually given way to frankly avowed commercial considerations, and in the last crusades, it had not been so much a question of saving the "Holy Sepulchre," as of amassing wealth. And when the possibility of gathering spoils had vanished beyond recall, the desire to keep the grave of Christ in the care of Christian hands had lost its dearest incentive.

But an outlet had to be found for the irre-

possible longing to expand which filled the breast of the trading class. It had gradually dawned on the thinkers of Europe, that this globe was a good deal larger than the Ptolemaic system supposed. The travels of Marco Polo, made possible by the unification of Eastern Asia under the rule of Genghis Khan, had revived the ancient wonder-tales which the conquests of Alexander the Great had carried back into the Western world. The invasions of the Huns had reminded Europe forcibly of the fact that there was a vast territory of unknown extent beyond the generally accepted boundaries of the globe, and the temporary control of Eastern ports in the Mediterranean and Black Sea, together with the establishment of advanced trading posts in Asia Minor, had given a substantial basis to the idea that the Eastern world contained fabulous riches. Besides, even in ancient times, the Ptolemaic system had not been accepted by all thinkers as correct. Now the doubts as to its correctness grew still more.

The improvement of shipbuilding had even before this time permitted daring navigators to venture out into the unknown seas of the West. And when it became a vital necessity for the trading class to get in touch with the East by

some hitherto untried route, it was not long before exploring trips were undertaken. It is true, no scientific proofs of the unsoundness of the Ptolemaic system had as yet been produced. But the practical navigators did not wait for the theoretical proofs of its unsoundness. On a southward trip made by Bartolomeo Dias in the years 1486 and 1487, the Cape of Good Hope was discovered and the map of the world considerably extended. On October 12, 1492, Columbus landed on San Salvador, Bahama Islands. In 1497, John Cabot discovered the mainland of North America. The year after that, Sebastian Cabot went in search of a Northwest passage to China, and Vasgo de Gama landed in India after a successful trip around the Cape of Good Hope. In 1499, Ojeda and Vespucci sailed along the east coast of South America.

The earth had suddenly grown to twice its former size. Columbus had made good his claim that it was a round globe, not flat. The discoveries of other navigators clinched his proof. While the wise men were still debating this stupendous revolution of their ideas, the trading class vigorously pushed forward into the newly discovered territory and began to gather untold wealth. The church winked its eye and pocketed

its share. Although these discoveries were the entering wedge which split open the entire dogmatic world-conception, the church did not think of condemning the daring navigators as heretics. Their heresy paid well. Besides, these explorations offered a great field for the expenditure of more religious fanaticism in a new direction. There were new nations to convert by fire and sword, and they were not so hard to "convince" as the Turks, because they could only argue with primitive weapons against the improved arms of the Europeans, who, thanks to Berthold Schwarz, could now lend emphasis to their religious propaganda by the help of gunpowder.

In 1513, Balboa saw the Pacific Ocean from the Isthmus of Panama. In 1520, Magellan sailed through the straits between Tierra del Fuego and Patagonia which henceforth bore his name; in 1521 he reached the Ladrones, and Cortes conquered Mexico. And in 1531–33, Pizarro looted Peru. At the same time, the Turks pushed westward and threatened Vienna.

Every one of these historical events was a nail in the coffin of ecclesiastical feudalism, and the church, being the greatest feudal lord, helped to drive those nails by making itself a party to these

looting expeditions, and covering them with the cloak of missionary work.

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VII. The Struggle for More Light

The mental reaction of these discoveries on philosophy and astronomy followed immediately. In the same year in which Sebastian Cabot set out on his trip across the North Atlantic, Savonarola was killed for his opposition to the church. While Columbus was making his second and third trip to the West Indies, Luther was girding his loins against Rome, and three years before the discovery of the Straits of Magellan, he nailed his theses on the church door in Wittenberg. One year after the conquest of Peru, England threw off the papal yoke, the Anabaptists assembled in Munster, and Luther completed his translation of the Bible. While the foundations of Lima and Buenos Ayres were being laid in South America, the first copies of the translated Bible were on the press, thanks to the invention of printing by Gutenberg, in 1438. The first enemy of orthodox religion, a new religion, had arisen.

Science, the second and more dangerous enemy

of orthodoxy, was not slow in following. In 1473, Copernicus had been born. Before De Soto had reached the Mississippi river, Copernicus had completed his life's work, and on his dying day, in the year 1543, he received the first copy of his great work, "*De Revolutionibus Orbium Celestium*" (The Revolution of Celestial Bodies). In order to understand the powerful impression made by this work, we must fully enter into the spirit of those times. For centuries it had been a gospel truth that the earth stood still, that it was the center of the universe, that the sun, moon, and stars revolved around it from East to West. Now this daring astronomer claimed that the earth was moving around itself from West to East, and around the sun in a wide orbit, and that the sun was the center of its planetary system. That was contrary to all the established teachings of the dogmatic scientists, it was opposed to the revealed "truths" of the Bible, it was heresy. *Anathema sit!*

But the time was approaching, when the anathema of the church did not stop the wheels of scientific progress any more. The cities needed the help of science and protected their scientific explorers. In 1616, Harvey discovered the circulation of the blood, a new step toward an

experimental philosophy. When the pilgrims were landing in Plymouth, in 1620, Galileo Galilei and John Kepler were engaged in further undermining dogmatic ignorance by their revolutionary work. Galilei is the founder of experimental physics. He gave a scientific foundation to the theory of gravity, invented the pendulum, a hydrostatic balance, a thermometer, compasses used in designing, and a telescope. In 1610, he for the first time observed the satellites of the planet Jupiter. In 1632, he published his main work, "Four Dialogues on the Ptolemaic and Copernican World Systems."

Perhaps the church would not have cared so much about these scientific revolts against its established ideas of the world, had they remained mere academic discussions. For after all, none of them touched the foundation of the spiritual beliefs of the dogmatic religion, and it would have been easy enough to adjust the spiritual creed to this new science, without losing control of the minds of the masses who believed in the spiritual basis of the church. Even the ideas of Luther might have been tolerated, had they preserved a mere scholastic existence. They were no more dangerous than had been many other religious heresies before that time.

As a matter of fact, though Galilei was tried for heresy on account of the above work, he was treated without harshness, and even his obstinate *"E pur si muove"* (And yet it moves), uttered immediately after the revocation of his theories, did not result in any increased penalty for him. Luther might also have escaped with no more severe penalties than Galilei, had it been merely a question of a religious controversy.

But the class-struggle seized upon both religion and science, just as it had done before, and as it will continue to do so long as class antagonisms exist. To the extent that the merchant class grew in wealth and power, it did not only protect the new world-conception, but also began to question the right of the church to collect taxes and to mismanage church-property. And the ideas of religious reformers became at once the rallying center of bands of revolting peasants and impoverished nobles, who threatened the holdings of the church in land and movable wealth. This outraged and hurt the hierarchy more than all attacks on established articles of faith and philosophy.

For this reason, it became a matter of self-defence for the Roman church to call reactionary science, religious fanaticism, and the entire appa-

ratus of its organization to its assistance against the new and startling evolution of things and ideas. So Tycho de Brahe entered the arena to defend the Ptolemaic system against Galilei and Kepler. Tetzlaff defended the right of the church to levy taxes. Luther was challenged to defend his ideas at Worms. And the feudal rulers were instigated to gather their armed forces and make war on the burghers and peasants. The Reformation with its economic and mental revolution struck deep into the flesh of the church, and paved the way for the subsequent freedom of scientific investigation which accumulated in the course of the following centuries the basic facts for a consistent theory of evolution.

When astronomy, geography, experimental physics, and physiology were engaged in their first determined attempts to clear away the metaphysical rubbish of the Middle Ages and push human thought once more into its truly evolutionary course, philosophy likewise awoke from its long slumber. For almost 1900 years, the methods of the natural philosophers had been abandoned. During all that time, the human mind had been wandering aimlessly in the mazes of metaphysical speculation. Revelation, instead

of being sought in the open book of nature, had been looked for with up-turned eyes beyond the clouds, in fairy-land.

At last, in 1620, Francis Bacon published his "*Novum Organon.*" His plea for new methods of research in the study of nature was a fatal blow to the metaphysical philosophy of Aristotle. By demanding a "new mind" and declaring the human senses the infallible sources of all understanding, Bacon infused new life into the natural philosophy of ancient Greece and pointed human evolution once more into the redeeming course of evolutionary materialism.

However, it cannot be emphasized too strongly, that the idea of evolution, though sporadically scattered through Bacon's philosophy and that of other materialists of the 17th and 18th centuries, had but a spasmodic existence among them, and was frequently not even as clearly expressed as we find it in the works of the Grecian natural philosophers. The historical conditions for an empirical proof of evolution had not yet matured, and the theological influence of those times applied the brake too heavily for a rapid improvement of the ideas of the natural philosophers.

Furthermore, the ancient natural philosophy had been the rallying center of Grecian "democ-

racy." It had been the scientific weapon of progress in the class-struggle between aristocracy and democracy, at a time when theology was not enthroned as an economic ruler, and when religion had at best but a slight hold on men's minds. The new materialist philosophy, on the other hand, arose at a time when the class-struggles raged fiercely around two religions, and when philosophy did not reach down into the world of the trading and working classes. Through the influence of the church, Latin had become the language of science, and in consequence the new materialist philosophy came upon the scene, not as a social force, but as a hobby of scholars, a pastime of the select. And it continued to use Latin as its medium of expression for a long time. Indeed, we have not gotten away from this reactionary habit yet, and the fostering of ancient languages in our modern schools still continues to do valiant service in the interest of reaction. It is not until the modern proletariat creates its own science, that the old exclusive and aristocratic mannerisms of feudal and middle class science are abandoned, and the familiar language of the day employed to prepare the mental food for the eager proletarian student.

In the 17th century, and to a great extent also

in the 18th and 19th, the exclusive methods and assumptions of aristocratic science were fatal, not alone for the masses, but also for the scientists themselves. So long as science does not pulsate in the throbbing life outside of the study of the scientist, theological or metaphysical speculations permeate the entire fabric of society. In the 17th century, the class-struggles between the two great religions kept the popular mind in a state of continuous excitement so that even kings had to be careful not to exasperate the people in theological matters. Neither Bacon nor the other materialists of the 17th century could get away from this religious atmosphere, and their materialism is, therefore, strongly tainted with theological and metaphysical inconsistencies. As a logical result, materialism did not get very far along on its evolutionary road, and metaphysics retained its sway in science as well as in philosophy. Nevertheless, it is the merit of Bacon to have imparted fresh vigor to the inductive and empirical study of nature.

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VIII. The Rehabilitation of Natural Philosophy in England

The men who built on the foundation laid by Bacon developed his materialism in two different directions. Those who felt attracted by the theistic aphorisms of his doctrine, became the fathers of metaphysical schools of thinkers in England and France. On the other hand, those who felt kin to the materialist essence of Baconian philosophy, continued along this road and thus became the intellectual fathers of the socialist philosophy. Frequently these two tendencies intermingled and produced a hybrid materialist dualism, which was quite as incongruous as the metaphysical materialism of their predecessors.

This imperfect and groping philosophy led to absurd contradictions between the theory and practice of scientists and philosophers. For instance, the logical successor of Bacon, Hobbes, was more pronounced and consistent in his materialism than Bacon, and pushed the human mind forward in the line of evolution toward a more empirical and monistic science. But politically he was a reactionary of the first water, a

defender of royal prerogative and absolutism, a foe of the *puer robustus sed malitiosus* (robust but malicious boy), the "common" people. On the other hand, Hegel, the father of modern idealism and a vigorous opponent of materialism, became the founder of the most revolutionary method of research, the dialectic method, and constructed the fundament of the modern ideas of evolution. This conflict between theory and practice characterizes all scientists and philosophers, with the exception of the founders of scientific socialism and of their socialist disciples. It is a fact, which explains itself out of the historical conditions of proletarian evolution, that the scientific socialists are the only consistent monist materialists of the present day. It is the "irony of fate," which compels the reactionary forces to do evolutionary work against their will and to assist the proletarian scientists, who are conscious evolutionists from necessity, in their historical mission. The most conspicuous example of this historical contradiction between theory and practice is furnished by the churches. Yet they, too, in spite of their reactionary and anti-proletarian practices, have been compelled to level distinctions between classes, nations, and races, and to prepare the ground for a universal evolution

toward human brotherhood. The use of Latin in science, to which I have just alluded, illustrates one phase of this leveling process very well. When the proletariat of the Roman empire had been defeated in its evolutionary aims, the Roman church cultivated Latin as an international language. And though it promoted an internationalism of the select few, yet even this gradually served to antagonize the reactionary power of dogmatism, since it was the most relentless foe of theological dogmatism, science, which finally cultivated Latin as an international language. And this science is in our day more and more compelled to ally itself with the class-conscious proletariat. It is a significant fact that all modern languages, which have become more or less world-languages, such as Spanish, French, and English, contain many elements of Latin. And since English is rapidly becoming the international language of the so-called civilized world, the modern proletariat will have little difficulty in assimilating the scant survivals of Latin which are indispensable for an understanding of the technicalities of modern science.

However, in Bacon's time natural philosophy tottered about rather drowsily after 1900 years of sleep, and took but slight notice of the ominous

handwriting which capitalist development was slowly but surely tracing on the wall of social institutions. So much more briskly did economic evolution proceed on its course, sowing the seeds of future revolutions, which would in due time clear the field for a more scientific and evolutionary materialism. For instance, when cotton-planting was introduced in Virginia, one year after the publication of Bacon's *"Novum Organon,"* the germs were scattered for the Civil War, that was destined to shake the foundations of the future North-American republic, 245 years later, and to sound the tocsin for a proletarian movement, which would some day reap the mature fruits of materialist science.

At the same time, inventors began to cast about for means of increasing the productivity of labor, and natural science gathered more empirical material for its special departments.

Early in the 17th century, De Caus, a French engineer, had invented a machine by which a column of water could be elevated by the pressure of steam confined in a vessel above the water. In 1629, Branca, an Italian inventor, contrived a plan for working several mills by a blast of steam against the vanes. In 1639, the transit of Venus across the orb of the sun was for the first time

observed by Horrox. The barometer was invented by Torricelli in 1642. The marquis of Worcester described, in his "Century of Inventions," 1663, an apparatus for raising water by the expansive force of steam. Two years later, Isaac Newton published his first improved methods of astronomical calculation. In 1669, Brandt discovered phosphorus. Roemer ascertained the velocity of light in 1675. Leibniz published his invention of the differential calculus in 1684. And in 1687, Newton came forth with his "*Principia*," enunciating the laws of gravity. Denis Papin, a native of France and professor at the university of Marburg, Germany, conceived the idea, in 1688, of obtaining motive power by means of a piston working in a cylinder, through a sudden condensation of steam by cold. In 1698, Captain Savery, an Englishman, obtained a patent for the first actual working steam engine to be used in raising water. And in 1705, Thomas Newcomen, a blacksmith, and John Cawley, a plumber, patented an atmospheric engine, in which condensation was effected by pouring cold water upon the external surface of a cylinder.

These pioneer efforts in the construction of steam engines were not to be crowned with success until June 5, 1769, when James Watt ob-

tained his first patent for an automatic steam engine. So far as the philosophy of the 17th century was concerned, these industrial and scientific advances made little impression on it. When in 1641, Descartes (Cartesius) published his *"Meditationes de Prima Philosophia,"* he showed himself to be still completely in the thrall of metaphysics. He contended that man alone had a true "soul," with sensation and free will, and that animals were mere automata, without will or sensibility. At the same time, he suffered from the traditional contradictions of men of his turn of mind. While in his philosophy, he attributed a dualist and supernatural soul to man, he endowed, in his physics, matter with self-creating power and regarded mechanical motion as its life's function.

A valiant antagonist arose against the Cartesian metaphysics in the person of Hobbes. He published, in 1642, his *"Elementa Philosophica de Cive,"* and fortified the materialist position in this and other works considerably. By asserting that it is impossible to separate thought from matter that thinks, he did not only strike the Cartesian metaphysics heavily, but also shattered the theistic survivals of Baconian materialism. However, the historical conditions did not enable

him to furnish the proof for Bacon's fundamental principle that all human understanding arises from the world of sensations. On the other hand, he was the first of the modern natural philosophers to make a clear distinction between the natural and social environment and to realize that social activity is a part of the general activity of the universe. In his "Leviathan," published in 1651, he says: "The register of knowledge of fact is called history. Whereof there be two sorts, one called natural history, which is the history of such facts or effects of nature as have no dependence on man's will, such as the histories of metals, plants, animals, regions, and the like. The other is civil history, which is the history of the voluntary actions of men in commonwealths." The modern monist will find much to criticise in these definitions, but they mark nevertheless an advance in the evolution of thought as compared to the ideas of his predecessors and contemporaries.

In Leibniz and Spinoza, Descartes found allies who contributed much toward the prolongation of the life of metaphysics, and theistic idealism had an eloquent spokesman in Berkeley. Even a man of Newton's mathematical mind remained a lifelong captive of dualistic ideas and his concep-

tion of the solar system was of the crude kind which speculated about the causes of the "first impulse" for the motion of the planets. Still his ideas seemed so dangerous to the theological dualists that for instance Leibniz denounced the Newtonian theory of gravitation, because it undermined natural religion and denied revealed religion. The theistic ideas owed a continued existence to the influence of Rousseau and Voltaire, though especially the last-named was a scoffer at all religions based on supernatural revelation.

But materialism remained close on the trail of metaphysics. In France, Descartes was personally confronted by Gassendi, who revived Epicurean materialism and accomplished for materialism in France what Hobbes did in England. And Pierre Bayle prepared the way for a more mature philosophy in France by a cutting criticism of Cartesian metaphysics. Driven by religious doubts to a closer study of metaphysics, Bayle wrote the history of metaphysics only to give dualism a blow from which it would never fully recover.

After this destructive work of materialistic criticism, Locke appeared as a constructive materialist, in 1690, with his "Essay Concerning Human Understanding," which was enthusias-

tically received by all friends of enlightenment, especially in France. He furnished the first philosophical proofs of the fact that all human ideas are due to the functions of the senses, and thus completed Baconian materialism which Hobbes had systematized.

Locke's work came at a time when metaphysics had gradually lost its touch with the sciences that had once given it a certain authority. While mathematics, physics, zoology, astronomy, chemistry, and other exact sciences, made themselves more and more independent, metaphysics retained nothing but speculations and a mystical belief in celestial things. But when the last great metaphysicians of the 17th century, Malebranche and Arnauld, died, worldly affairs were beginning to absorb public interest to the exclusion of supernatural speculations. To the same extent did materialism gain favor among Frenchmen.

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IX. Natural Philosophy in France.

With the beginning of the 18th century, we see the French champions of enlightenment engaged in open war against metaphysics, theology, and

the existing political institutions. In the interest of "reason," all hitherto existing ideas and institutions had to be submitted to the most ruthless criticism, and this "reason" was nothing else but the dictates of the class-interests of the French bourgeoisie. In England on the other hand, the bourgeois revolution had at that time found its temporary armistice in the compromise of 1689, which left the great land-owners in possession of the spoils of political office, while it at the same time safeguarded the economic interests of the rising bourgeoisie sufficiently for the time being. The English bourgeois, was, therefore, as much interested as the nobility in maintaining the influence of religion "for the people," meaning for the exploitation of the working class, while the French bourgeois was compelled, by the requirements of the historical situation in France, to stir the working class to the highest pitch of revolutionary activity against the feudal nobility.

Materialism, therefore, in the 18th century, took up its abode in France. Once more the irony of fate would have it that the metaphysicians had to furnish the weapons for their own undoing. For French materialism developed two schools, and one of them took its departure from the physics of the metaphysician Descartes. The

other school started out from Locke, and led directly to Socialism. Descartian materialism became the father of that mechanical materialism which characterizes the bourgeois materialists of the 18th and 19th centuries, who were either ignorant of evolutionary materialism, or opposed to it. It furnished at first the basis for the natural science of France, and, combined with theistic idealism, it became the stronghold of those who, like Cuvier and Agassiz, clung to the Mosaic idea of creation and to the theory of fixed species, in opposition to the introduction of the idea of development by the interaction of physical and chemical movements. The followers of Locke, on the other hand, cultivated the evolutionary branch of French materialism.

"The immediate disciple and French interpreter of Locke, Condillac, directed the point of Locke's sensationalism at once against the metaphysics of the 17th century," writes Karl Marx in the "Holy Family," in which he and Frederick Engels exposed the shallowness of the Young-Hegelians of the Bruno Bauer stripe. "He proved that the French justly rejected metaphysics, because it was merely a handiwork of imagination and theological prejudices. He published a refutation of the systems of Descartes,

Spinoza, Leibniz, and Malebranche. In his work, *'L'essai sur l'Origine des Connaissances Humaines,'* he elaborated the ideas of Locke and proved that not only the soul, but also the senses, not only the art of producing ideas, but also the art of sense-perceptions, was a matter of experience and habit. The entire development of man therefore depends on education and external circumstances. . . . From Helvetius, who likewise takes his departure from Locke, materialism received its specific French character. He also takes into consideration the social life, in his work, *'De L'Homme.'* The senses and self-love, enjoyment and a well understood personal interest, are the basis of all morality. The natural equality of human intelligences, the identity of the progress of reason and the progress of industry, the natural goodness of man, the omnipotence of education, are the main points of his system.

"A combination of Cartesian and English materialism is found in the writings of Lamettrie. He utilized the physics of Descartes to their minutest details. His machine-man is an elaboration of the Cartesian machine-animal. In the *'Systeme de la Nature'* of Holbach, the physical part consists likewise of a combination of French and English materialism, while the ethical part

is based principally on the ethics of Helvetius."

The universality of the French materialists has a lasting monument in the "*Encyclopédie*," which was begun by Diderot and D'Alembert in 1751, and in which Robinet, Buffon, Holbach, Condillac, Lamettrie, Helvetius and Grimm collaborated.

The French encyclopedists offer a fair standard by which to judge the scientific position of their age. Science was still in its rudimentary stage, and this corresponded to the control of tools and technique in keeping with the prevailing mode of production. The two epoch-making works on natural history typical for this period are the "*Systema Naturae*," published by Linnæus in 1735, and the "*Histoire Naturelle*," published by Buffon in 1749. Franklin made his successful experiments demonstrating the connection between electricity and lightning in 1752. But neither his work, nor the invention of the spinning-jenny by Hargreaves in 1767, and the perfection of the spinning frame by Arkwright in 1769, produced any immediate effect on the ideas of scientific explorers. Cook was making his first voyage around the world, about this time (1768), and Priestley discovered oxygen in 1774, without, however, knowing what he had discovered.

The philosophical work, which followed in England immediately after Locke's "Essay," was Hume's "Treatise of Human Nature," published in 1739. It cannot be regarded as an advance beyond Locke, nor is it superior to the work of the French materialists. Hume was a better historian than philosopher, but even as a historian he fell far below Vico, who in the beginning of the 18th century had made an attempt to substitute for the theological conception of history a method which regarded historical events as the fulfillment of natural laws. Nor was Hume the equal of Gibbon, who, in 1776, published his "Decline and Fall of the Roman Empire," in which faint traces of an evolutionary conception of history appear. On the other hand, Rousseau's "*Contrat Social*," published in 1762, was but a feeble attempt to explain the origin of human societies, without the slightest recognition of the basic factors of social evolution.

A brighter light falls upon this historical period from the department of mathematics, criminology, and economics. In mathematics, the idea of continuity led to the introduction of evolutionary ideas into natural science. Buffon, who had entered the French Academy as a geometrician, introduced the continuity-idea into his "*His-*

toire Naturelle," and this idea became the spark, which, in the hands of Lamarck, later on started the fire of organic development in all natural sciences.

In criminology, Beccaria made a new departure in Italy, in 1774. He published his work on crime and punishment under a false date and with a false place of publication, knowing that his ideas, which were impregnated with the spirit of the impending French Revolution, would set loose a storm of reactionary attacks against him. He opposed the medieval methods of "justice," with their torture and secret proceedings, and undermined the conception of a personal responsibility of criminals. This threatened the dearest tenets of theological dogmas about "vicarious atonement," and set the jesuitical machine of the church into frenzied motion.

In economics, the year 1776 marks a milestone of advance in Adam Smith's "Wealth of Nations," which subverted the current ideas on the origin of profits. Smith declared in so many words, that profits were not an arbitrary addition of the seller to the price of his article, but surplus-values, surplus-products, appropriated by the owners of means of production out of the unpaid products of "industrious persons." This con-

ception became the basis for Ricardo's law of value, which, in the hands of Marx, was transformed into the revolutionary analysis of capitalist production, out of which the modern socialist movement developed its life.

Generally speaking, there was as yet no clear perception of the evolutionary nature of social and natural processes, neither in the writings of the sociologists, nor in those of the scientists and philosophers. While Buffon showed at least a faint trace of continuous development in his work, Linnæus regarded his system of plants and animals avowedly as a mere diagrammatic classification, without the least suggestion of any natural connection between the various classes of animals and plants. And even when he elaborated the first outlines for a natural system of classification, he still had the idea of fixed and created species in mind.

But already the fiery glow of the bourgeois revolution in the American colonies was reddening the western horizon, and its sparks were soon to ignite the dry feudal structures in France. The Declaration of Independence asserted that "all men were born equal," but the writers of this document and their class forgot to apply this "truth" to the slaves, indentured servants, debt-

ors, and propertyless colonists who were debarred from voting. Nevertheless, this document marked at least the awakening consciousness of the "Rights of Man" and the "Age of Reason," that is to say, the consciousness of the rising capitalist class that they had their own peculiar idea of right and reason, as opposed to the feudal powers. With the American and French Revolutions, the capitalist class established a precedent in social evolution by means of revolution, which is still of too recent date to be easily forgotten, and which the modern proletariat will some day follow with good effect.

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X. A Reversion to Idealism in Germany

The English and French jingoes of the 17th and 18th centuries were doubtless convinced that their countries were not only the leaders of Europe in economic and political progress, but also the pathfinders in science and philosophy. The wider horizon of the present day enables us to notice without difficulty, that a few thinkers of other nationalities, who viewed the events in England and France at a distance and enjoyed

the advantage of undisturbed study and seclusion, did as much, if not more, for the evolution of human understanding as the scientists and philosophers of those industrially and politically more advanced countries.

Of course, the list of the scientific accomplishments of those two countries is not exhausted by the enumeration of the few facts previously mentioned as mile-stones in the road of evolutionary theories. Many other significant advances might be mentioned. To name but a few, the work of Hooke and Grew for the elaboration of the cell-theory, the discovery of the function of the stamens of flowers by Millington, and the attempts at classification made by Ray, the forerunner of Linnæus, were among the minor steps in a forward direction. Priestley's studies on the absorption of carbon-dioxide and the evolution of oxygen by plants were rendered epoch-making by the deeper research of Lavoisier, who subverted the entire phlogistic theory of chemistry by showing the actual function of oxygen. But the significance of these discoveries for the progress of science was not appreciated in those times, not even by their authors. Their relation to philosophy was still less suspected.

This is especially true of an invention, which

opened up entirely new fields of study, and has become one of the most revolutionary aids in evolution, the microscope. It developed out of the magnifying glass, and came into use as a scientific instrument about the beginning of the 17th century. Francesco Stelluti is regarded as the first who made its use known to science. It became especially effective in the hands of Malpighi and Leeuwenhoek. Malpighi, in the latter half of the 17th century, published a complete anatomy of the silk-worm and studied the development of the chicken in the egg. Leeuwenhoek discovered the blood corpuscles and described the active elements in the semen of male animals. After these scientists came an able corps of investigators and used the microscope to good effect in laying the foundation for an understanding of the individual development (ontogeny) of beings. From ontogeny to phylogeny, that is to say to the development of species, genera, classes, families, races, was but a logical step, which was made in the 19th century as soon as the material premises for it had developed.

But in the 17th and 18th centuries, the microscopical revelations " fell flat." This was mainly due to the prevailing theological conception of nature and to the lack of interrelation between

the various sciences, which aggravated the difficulties arising from insufficient experience and from the undeveloped state of human control over society and nature.

Under these circumstances, a similar fate befell a work, which in our day ranks high in the literature of evolution — Kant's "Natural History and Theory of the Heavens," published in 1755, the year of the great earthquake, which in five minutes destroyed the city of Lisbon and killed 60,000 people. Hardly anyone took notice of the ideas advanced in this work, until Laplace, in 1799, published his *"Mécanique Céleste"* and furnished the mathematical proof for the Kantian hypotheses. Yet Kant's work was the most revolutionary, and, from the standpoint of materialist monism, most epoch-making publication since the time of Demokritos. In it the Königsberg philosopher undertook to treat of the "constitution and the mechanical origin of the entire universe on the basis of Newtonian principles." He proceeded to demonstrate that the sun and its system had developed mechanically by a rotation of a primitive nebular substance filling universal space, and thus established a theory, which has maintained itself up to the present day. Only in the beginning of the 20th

century a few voices have been lifted against it and a new cosmogeny advocated, which nevertheless, in its essence, is still a mere modification in modern garb of the atomic theory of Demokritos, on which Kant's theory is likewise based.

By demonstrating the mechanical origin of the universe and transforming the "divine" act of creation into a historical process, Kant went far beyond Newton, who had assumed that a god had given the first impulse to the universe and then left it to follow its own laws. Yet Kant, too, was loath to dismiss the creator. There was still a last hiding place for the mysterious element of dualism in the fact that the human understanding, with its present organization in the cosmic process, does not penetrate to the "final nature" of things. Kant made this fact the basis for carping attacks on Demokritos, on whose shoulders he stood and whose philosophy was in many respects superior to his own. Moreover, Kant never grasped the historical relation of Demokritos to Epicurus, and always regarded Epicurus as the father of "sensualism" (materialism), while we have seen that Epicurus was a follower of Demokritos. It is also indisputable that lack of historical perception was not the least of Kant's shortcomings. His philosophy

suffers especially from his unfamiliarity with those natural sciences, without which no sound theory of understanding can exist, namely comparative physiology, biology, and sociology. He never realized, that philosophy requires not alone the direct co-operation of these special sciences, but in the last analysis of every department of human knowledge. Even if we admit that this defect was largely due to the scantiness of the empirical material of his time and to the incomplete equipment of the Prussian universities under Frederick the Great, it was also a consequence of his extreme philistinism and book-worm tendencies. He certainly made more liberal concessions to the arrogance of orthodox and bureaucratic censorship, than many of his humbler intellectual contemporaries in Prussia.

But in spite of his mental gymnastics in the matter of a god, the fact remains, that his nebular theory of the origin of the universe, in its logical application, knocks the main prop from under the Mosaic world-conception, which had already been considerably shaken by the discoveries and demonstrations of Copernicus, Galilei, Kepler, and Newton. Laplace was more consistent and courageous than Kant and did not hesitate to declare in reply to a question of Napoleon I., that

he had no need of the hypothesis of a creator. No better proof is required for the soundness of this position, than the persistent silence, which the theologians have maintained about Kant's nebular hypothesis, while praising the dualistic ethics and theory of understanding contained in his second work, "The Critique of Pure Reason," published in 1781.

In order to appreciate Kant's philosophy fully, this work must be compared with his "Critique of Practical Reason," published in 1788. The essence of his teaching in the former work is, that the world of phenomena, such as we perceive it, is entirely conditioned on the organization of our senses. Owing to this fact, we can never perceive the true nature of a thing, the "thing in itself." There is only one universe, and everything in it is regulated by natural laws, operating as sternly as the law of gravitation. The freedom of will cannot be demonstrated by "pure" reason. The existence of a god and the immortality of the soul cannot be ascertained within the possible limits of experience.

However, throughout the work there are scattered passages stating the exact opposite. One would be at a loss to understand what Kant was really driving at, if he had not given an expla-

nation for his contradictions in his preface to the second edition of his work, 1787. There he says that he had "to abolish reason, in order to make room for belief." And this was necessary, in order that he might "confer an inestimable benefit on morality and religion, by showing that the objections urged against them may be silenced forever by the Socratic method, that is to say, by proving the ignorance of the objector. For as the world has never been, and no doubt will never be, without a system of metaphysics of one kind or another, it is the highest and weightiest concern of philosophy to render it powerless for harm, by closing up the sources of error." One of these sources of error, as he says in his "Critique of Pure Reason," is found in men like Locke, who promote the idea that the existence of a god and the immortality of the soul *can* be proven with mathematical certainty from the fact that there is no knowledge outside of experience.

What a strange spectacle! Materialist Locke reprimanded by idealist Kant for insisting that the existence of a god and the immortality of the soul *can* be mathematically demonstrated, and idealist Kant violently insisting that such a thing is entirely outside of all possible experience and

must be *believed!* And all for the benefit of religion and rulers! And what a peculiar logic! Fancy the Socratic method in the role of the invincible sword, which will lay open the ignorance of all objectors to religion, and remember that no religion in the world could stand the test of that method!

This, then, was the mighty outcome of two thousand years of philosophy since the time of Demokritos that religions were considered safe, and the states defended by them secure, *because* it could *not* be proven by experience that a god existed and that the human soul was immortal; that the mass of the people could never ascertain the truth of these things by their own unaided faculties, but must *believe* them upon the word of authorities! Surely, the mountain need not have labored through 500 pages of gold-brick science to bring forth such a mouse!

Of course, Kant had spoken the truth, when he said that theology must be believed. But what a strange fact, that all other schools of thought, especially the natural sciences and psychologies, should be compelled, under penalty of immediate ridicule, to demonstrate every iota of their theories by irrefutable evidence, while the champions of religion should be privileged to fling

their unprovable assertions into our teeth and insist that they were speaking the truth, *because* it could not be demonstrated. And that from the man, who had done more than any of his predecessors to undermine the world foundations, on which this preposterous assumption is resting!

Kant thus acknowledged voluntarily, that he was not a philosopher, who stood high above the world and men, but merely a common bourgeois sophist, who served the interests of the ruling class. As such he destroyed the dogmatic philosophy, which had done the work of feudal society so well, and established a philosophy, which was made to order for the requirements of the rising bourgeoisie. As a scientist, he was a materialist, who reiterated the philosophy of Democritus, Epicurus, and Locke, and who re-established the principle of mechanical development in nature, which was a distinct advance over the English and French materialists, if not over the Grecian natural philosophers. But as a philosopher, he was as scholastic, sophistical and reactionary as any foe of progress could be.

Much is made of Kant's "categorical imperative," the basis of his ethics, which runs: "Act at all times so that thou usest man in thy own person as well as in that of others not only

as a means, but also as an end." This ethics, like many another conceived by bourgeois minds after Kant, falls to pieces the moment it is tried as a rule of conduct in society. Its ambiguity, and therefore its meaninglessness, becomes apparent in the effects of class-environment on human reason. Well does Franz Mehring characterize the Kantian imperative, when he writes: "For the historical thinker, this statement of Kant's appears at once as the historical precipitation of the economic fact, that the bourgeoisie, in order to obtain objects of exploitation suitable for their ends, must not only use the working class as a means, but also take care to create a proletariat, in other words, to free them in the name of human liberty from feudal rule."

But in spite of his categorical imperative, and his admiration for the French revolution, Kant demanded full liberty only for the *citizens* of the state, not for all its members, especially not for the women and for the working class. Thus he fell back to the status of the Roman constitution under the Cæsars.

In his "Critique of Discrimination," Kant discovered the laws of creative imagination and demonstrated that art is an innate faculty of man. This work also contains the statement that the

descent of all organic beings from a common primeval ancestor is a thesis which is in conformity with the principle of mechanical development in nature. But Kant deprecated such a hypothesis as a "risky adventure of reason." He was afraid of the logical application of the very principle which he had established in his cosmogeny. In other respects, however, this work and his cosmological views may be read with profit, even by modern proletarians.

The thinker of the present day, with his vast array of empirical facts, is apt to be too harsh in his judgment of the shortcomings of his predecessors in earlier centuries. But I cannot blame Paul Ree for summing up Kant's philosophy in these words: "In Kant's works you feel as though you were at a country fair. You can buy from him anything you want — freedom of the will and captivity of the will, idealism and a refutation of idealism, atheism and the good Lord. Like a juggler out of an empty hat, so Kant draws out of the concept of duty a god, immortality, freedom, to the great surprise of his readers. True, these illegitimate children of Kant's philosophy do not like to venture forth into the light of day. They are somewhat ashamed of their existence, more especially so,

because they find favor in the eyes of god and men, particularly of men clothed with authority."

The followers of Kant claim that he has defined the powers and limits of human perception for all time to come. But the "Critique of Pure Reason" demonstrates precisely the impossibility of such absolute perception on the part of Kant or of any other man. His own powers of perception, especially in sociology, certainly never penetrated beyond the bourgeois horizon, and in other respects even some of his immediate followers surpassed him, for instance Laplace in his elaboration of the nebular theory, and Schopenhauer, the legitimate heir of his philosophy, in ethics. As for the germ of truth contained in Kant's "categorical imperative" and in his "thing in itself," we shall see that proletarian philosophers gathered out of it an advance in thought for the revolution of the modern working class.

In the same year, in which Kant's "Critique of Pure Reason" appeared, Herschel discovered the planet Uranus. And two years later, the brothers Montgolfier made their first successful balloon ascension, opening new fields of research in the atmosphere and spurring the inventive minds of humanity to greater technical exertions.

In 1789, Lavoisier established the law of the conservation of matter, which, supplemented in 1842 by Robert Mayer's law of the conservation of energy, remained one of the fundamental tenets of modern science, until the evolutionary conception of the transformation of energy was introduced at a later stage. In 1791, Galvani published his discoveries in animal electricity, and Thomas Paine appeared with his "Rights of Man." Galvani's discovery led to startling industrial revolutions in the 19th century. Paine's idea that man has natural rights, which no other creature in the universe has, furnished a great deal of powder to the bourgeoisie, so long as they were revolutionary, but philosophically it was a step backward and away from a monistic conception of the universe and human society. Paine stood in sociology on the same ground as Rousseau, and was as little aware of the existence and functions of evolutionary development and class-struggles as the celebrated Frenchman.

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XI. In the Melting Pot of the French Revolution

The French revolution had broken out in the meantime, and the philosophers now had an opportunity to watch what pure reason, practical reason, natural rights, the categorical imperative, the social contract, and metaphysical idealism could accomplish. After wading through rivers of blood at the instigation of practical reason, pure reason mounted the throne by decree of the national convention, on November 10, 1793. The worship of reason, lasted till June 8, 1794, when Robespierre brought god and metaphysical idealism back to the throne, dethroned reason, declared atheism to be an aristocratic sin, and celebrated the festival of the supreme being. But on July 27, 1794, the supreme being remembered the categorical imperative, left Robespierre ungratefully in the lurch, and looked on at a safe distance while "eternal justice" chopped off the good man's head with that gory instrument of natural rights introduced by practical reason, the guillotine. Lavoisier received the same reward for his services to mankind that Robespierre earned for his services to the supreme being.

Reason and the supreme being continued to relieve one another, until finally Napoleon I. replaced them both by bayonets and cannons, and discredited the supreme being by declaring that it was always on the side of the strongest battalions. And so the reign of reason and of the supreme being ended in the nauseating farce of the restoration of "law and order."

The reign of reason appeared on closer scrutiny as a transcendental image of the capitalist state. The existence of the supreme being had not been proven, neither by decree of parliament nor by the guillotine, and for that very reason it continued to exist in those heads which were accustomed to reason no better than those which had been chopped off. The categorical imperative, stripped of its gaudy trappings, stood forth as the impotent and incapable wag that he was. The social contract was renewed on the basis of "Every one for himself and the devil takes the hindmost." And the natural rights were bossed around by the right to exploit the proletariat and to place private property above propertyless man.

In the beginning of the 19th century, the disappointment over the failure of all the glittering ideals of bourgeois philosophy soon made itself

felt in an awakening of evolutionary ideas in social science among the champions of the working class. Fourier began to elaborate his theories of social reconstruction, in 1799, and to aim the dagger thrusts of his critique at the heart of capitalist society. And for the first time since the overthrow of women's equality with men in prehistoric times, a woman, Mary Wollstonecraft, raised her voice in public protest against the economic and social slavery of her sex. Saint Simon saw dimly that material forces are the active element in social movements and compel society to develop mechanically through class-struggles. And Fourier, after him, drew the first theoretical outline of the evolution of man from savagery, through barbarism and patriarchy, to civilization. The investigators of the 19th century following him were soon to supply the empirical proofs of this theory. On the other side of the channel, Robert Owen startled the comfortable English bourgeois with his colony at New-Lanark and threw the firebrand of the Chartist movement into the quiet dulness of British life.

These first half-conscious movements of proletarian thought were as immature as capitalism itself was. But they were at least unmistakably proletarian, and this fact makes the utopias of

these three men superior to the dreams of Plato and More. Historically, these French and English utopians excelled also their followers, such as Bellamy and Groenlund, in keenness of perception and political influence. All the attempts at independent proletarian movements in the beginning of the 19th century connected themselves with the ideas of these prophets of social revolution. Philosophically, these men were the heirs of Locke and of his French school. Whoever is looking for the roots of the modern socialist philosophy, must seek them here. No one knew this as well as the founders of scientific socialism. Some of the modern socialists are of the opinion that the socialist philosophy took its departure from the German classical philosophy. But Marx and Engels knew better, and Engels entitled his book on Feuerbach advisedly "Feuerbach and the Outcome of German Classical Philosophy," and declared that the modern proletariat was the "heir" of this philosophy, and would accomplish what German idealism had left undone. Scientific Socialism rejected the classical philosophy of Germany, took its departure from the humanitarianism of Feuerbach, and connected itself with the materialist philosophy of the 18th century.

This acknowledgment was made by Marx and Engels, in "The Holy Family," in these words: "Just as Cartesian materialism leads to French natural science, so the other school of French materialism leads directly to socialism and communism. It requires no great keenness of perception to realize that the doctrines of materialism relative to the original goodness and equal intellectual endowment of men, to the omnipotence of experience, habit, education, and the influence of external circumstances on men, the great importance of industry, the justification of enjoyment, etc., lead necessarily to a connection with communism and socialism. If man gets all his knowledge and feeling, etc., from the world of sense perceptions and his contact with it, then the thing to do is to arrange matters in the material world in such a way, that he gets truly human impressions from it, acquires them as habits, and realizes his human nature. If the correct understanding of material interests is the basic principle of all morality, then the private interests of man must be made to coincide with general human interests. If the human race is unfree in the sense that the materialists use this term, that is to say if man is free, not so much by his negative power to avoid this or that, but

rather by his positive power to assert his true individuality, then it is not proper to punish the crimes of the individual, but to destroy the antisocial breeding grounds of crime and to secure for every one the social room for his essential life expressions. If man is formed by external circumstances, then circumstances must be modeled to suit man. If man is by nature social, then he can develop his true nature only in society, and the power of his nature must not be judged by individuals, but by that of his societies. These and similar statements are found almost literally in the works of even the oldest French materialists. . . . Fourier takes his departure immediately from the teachings of the French materialists. The Babouvists were crude and uncivilized materialists, but even the developed communism starts directly from French materialism. The latter emigrated, in the form given to it by Helvetius, to its mother country, England. Bentham founded his system of well understood interests on the ethics of Helvetius, and Owen, starting from the system of Bentham, founded English communism. Exiled to England, the Frenchman Cabet was stimulated by the communist ideas of his exile and on his return to France became the most popular, although

the most superficial, representative of communism. The scientific French communists, Dezamy, Gay, etc., developed, like Owen, the teachings of materialism into those of realistic humanitarianism and into the logical basis of communism."

These statements show at the same time, that the French revolution did not settle any of the fundamental problems of life. That revolution merely testified to the incapability of the bourgeoisie to undertake the solution of any such problems. The first condition for their solution is the abolition of the bourgeoisie itself. It could not be very well expected of them that they should commit political suicide, or rather that they should "rise superior to their environment."

In fact, the history of the bourgeoisie is a series of struggles to keep from being pulled back into the old or pulled forward into a new class environment.

The revolution of a new class was necessary, before the great problems of the human race could be solved. This revolution came in due time.

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XII. The Wedding of Science and Natural Philosophy

The close of the 18th century was marked by two discoveries which left their imprint on science for a full hundred years. First, the introduction of vaccination as a preventive against smallpox, by Jenner, in 1796, stirred up the old bones in medicine, and in the second place, the invention of the Voltaic pile by Volta, in 1799 revived the interest in electricity. Jenner's idea showed that the futility of the prevailing symptomatic treatment of diseases was being realized, but his method was itself still a fight against symptoms, instead of a removal of causes. It must be admitted, that it was the best that could be done under the prevailing historical conditions, for capitalism limits all human activity to more or less symptomatic methods. One hundred years of practical experience with vaccination and similar preventive methods have demonstrated, that the scientific way to treat diseases is to remove their causes, and this understanding found its logical application in the revolutionary method of the class-conscious proletariat.

Volta's invention was the forerunner of great

discoveries in experimental physics, all of which were so many little stones in the beautiful mosaic of a monistic conception of the universe. Ever since Franklin had made his experiments with lightning, scientists had studied the atmospheric phenomena and investigated the nature of electricity. Rumford, in 1798, and Davy, in 1799, published the results of their experiments on the nature of heat. Thomas Young established the undulatory theory of ether by explaining the interference of light. And Dalton, who had elaborated his atomic theory in chemistry in 1803 and communicated it to Thomas Thompson in 1804, published his "New System of Chemical Philosophy" in 1808.

The fundamental laws, which dominated the physics and chemistry of the 19th century, were thus established. It was not until the beginning of the 20th century, that doubts as to the soundness of these three theories were expressed and the desire for their reconsideration became strong enough to lead to a greater accuracy in terms and definitions. Dalton made a new departure in chemical methods, and gave rise to two schools. One of them devoted itself to chemistry, the other to physics. The first result of Dalton's methods in chemistry was the practical determination of

atomic weights by Berzelius, begun in 1811. And in physics, Gay Lussac and Avogadro modified the Daltonian theory profoundly. Gay Lussac showed in 1808, that combination between gases always takes place in simple relations by volume, and that all gaseous densities are proportional either to the combined weights of the various substances, or to rational multiples of their weights. And Avogadro generalized the new ideas in 1811 and announced his law that "equal volumes of gas, under like conditions, of temperature and pressure, contain an equal number of molecules." At the same time, the principle of classification, adopted by natural science, worked its way into economics, politics, and law. These specialists were little aware of the fact, that they were contributing their share to a monistic conception of all phenomena in the universe, and undermining inch by inch the foundation on which the theological belief in supernatural miracles rested.

Capitalism was now in its ascending stage, and its technical requirements in transportation and markets soon led to an improvement of steam engines and means of general communication. Fitch made an unsuccessful attempt to introduce steam navigation on the Delaware, in 1790. The

first steamboat on the Clyde and Forth was launched by Symington, in 1802. And finally Fulton steamed up the Hudson, in 1807, and succeeded where Fitch had failed. The first locomotive was placed into practical commission in 1804, and the discovery that smooth wheels were better for railroads than toothed wheels was made in 1813. Then came the first successful trip of a train drawn by a locomotive, made by Stephenson, in 1829. Improvements in railroading were accompanied by the invention of the telegraph and telephone, the credit for which is due to Wheatstone, Oersted, Henry, Morse, Edison and Bell. Steam navigation across the Atlantic ocean was inaugurated in 1838, and the first trans-Atlantic cable between Europe and North America was completed in 1866. The postal and telegraph systems came rapidly into use, with cheap postage and mailing facilities. Capitalism penetrated into the remotest hamlets, created a world after its own image wherever it went, and at the same time abolished the element of distance in human intercourse.

From now on, scientific exploration trips to every quarter of the globe became a permanent feature of human life, and a network of scientific stations was spread over the surface of the earth

from pole to pole. The tropics and the frigid zones, the highest mountain ranges and the hidden valleys, the depths of the seas and the interior of the earth, were compelled to give up their secrets. Every unknown territory was invaded, and a steady stream of facts began to flow into the studies of the scientists. Soon hundreds of thousands of minds and hands were busy accumulating, sifting, classifying evidence, and theorizing on it. One startling discovery after another followed in bewildering succession. It would require volumes to appreciate the merits of even the most remarkable accomplishments of science, in the 19th century, for the formulation of a monistic conception of the world.

Specialization became an inevitable result of this activity. Among many new departments in science, the 19th century gave birth to that specialty, which has done more than any other to bring the nature of the human faculty of understanding into reach of empirical methods and take away the last mystical ground on which the theory of a supernatural soul rested. That specialty is biology. This term was first employed by Treviranus, who selected for his life's work the creation of a new science, which should study the forms and phenomena of *life,* its origin,

and the conditions and laws of its existence. In his "Biology, or Philosophy of Living Nature," published in 1802, he defined life as the "uniformity of reactions on unlike stimuli of the outer world." He thereby established a principle in natural science, which has been all too frequently overlooked by scientists and philosophers, namely the interrelation of the individual and its environment. But a few remembered it and used it with the most revolutionary effect. The living animal and plant now became the objects of study as well as the dead, and the most intimate processes of nature were stripped one by one of their mysterious character.

It is interesting to note, though quite natural from our point of view, that, the ideas of the ancient natural philosophers re-appeared simultaneously with the new accomplishments of science. Irrespective of confessional differences, scientists of various nations returned to materialist and monist methods. And evolutionary ideas unavoidably accompanied this tendency, for as we have seen, the ancient natural philosophers were all more or less imbued with evolutionary (dialectic) ideas.

When Goethe published his "Metamorphosis of Plants," in 1790, he intimated that a mysterious

law indicated the interrelation and common descent of all plants from one primeval type. And in his "Metamorphosis of Animals," he made the same claims in regard to the origin of animals. This was but a return of the human mind, after a long and fruitless drift around a circle, to the ideas of the Grecian natural philosophers. But now the facts for an empirical proof of this theory were within reach, and were soon to be marshalled against the Mosaic theories, which had dominated the human mind since the advent of the medieval church to power.

In 1809, Lamarck came forth with his "*Philosophie Zoologique*" and developed the theory of natural evolution systematically. He struck first of all a crushing blow at the metaphysical conception of the mysterious nature of life, which the naturalists of the 18th century had attributed to a supernatural vital force. He opposed this idea of vitalism by the theory that the primeval ancestors of living beings on this globe were the simplest organisms imaginable and were generated spontaneously by the interaction of physical causes, as soon as the globe had cooled sufficiently. Half a century later, such simple organisms were actually discovered, and still fifty years later the

first life processes were produced by mechanical means in the laboratory.

According to Lamarck, those simple primeval organisms were gradually transformed through changes in their conditions of life, leading to the greater use of some and to the disuse of other organs, to adaptations to changed environments, and to the transmission of new characters thus acquired by way of heredity. Similar ideas were advanced by Geoffroy Saint Hilaire and Oken. The misfortune of these pioneers of resurrected evolution was, that the palaeontological and embryological material for the substantiation of this theory was not yet sufficient to silence the opposition. And as the new ideas were at once violently assailed by reactionary thought, the champions of the new science had a hard stand. When Cuvier, the founder of comparative anatomy, challenged Geoffroy Saint Hilaire, in 1830, to a public debate, the old ideas of the Mosaic creation theory carried the day and remained victorious for thirty years longer.

But the general results of Cuvier's own specialty, comparative anatomy, led to the elaboration of a natural system of classification, which stands as an eloquent proof of the interrelation of forms claimed by Lamarck. And the flimsy

foundation of Cuvier's arguments was further shaken by the progress in other lines of science. In 1830, Lyell established the proofs of imperceptible and continuous development in geology in his "Principles of Geology," and pulled the crude catastrophic theory of Cuvier to shreds. And Humphrey Davy had already suggested in 1809, that matter might be of a much more complex structure than was generally assumed. He also intimated that matter might become radiant through very great velocity. Faraday made similar statements in 1816, but his work "On the Magnetization of Light and the Illumination of the Magnetic Lines of Force" did not appear until 1845. Ten years later he discovered the laws of electrolysis. These steps led directly to the theory of electrons and ions, and with these charged particles of matter the entire theory of atoms assumed a new aspect. Light and heat, electricity and magnetism, now appeared as very close relatives, and it required but a few steps more to establish the identity of all life's phenomena with electricity, magnetism, and radiation.

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XIII. The Outcome of Classic Philosophy in Germany

These conditions were at once reflected in philosophy. It was Hegel whose works marked the next milestone after Kant. Hegel's "Phenomenology of the Mind" appeared in 1807. His "Science of Logic" followed in 1812–16, his "Encyclopedia of Philosophical Sciences" in 1817, his "Philosophy of Right" and "Philosophy of Religion" in 1821, and his maturest work, the "Philosophy of History," in 1827. This last work differs from all previous historical works by its distinct recognition of evolution, although it does not understand the means by which the evolution of human societies is brought about. From now on, the world and society were regarded dialectically, that is to say as a succession of processes following one out of another. Things were no longer merely *static,* but also *dynamic and dialectic.*

But unfortunately, the mystical ideas were still predominating. The reaction after the French revolution had produced a profound dissatisfaction with materialism in the bourgeois mind, and as natural science had not yet permitted the ma-

terialist evolutionists to triumph, the indescribable longing of the bourgeoisie for the consolations of idealism and mysticism impressed itself on the thinkers of the day in a very forcible manner, especially since the proletariat was showing a decided affinity for materialism and plain speech. Too late did the French and German bourgeois realize, what the English capitalist class had understood a hundred years before, namely that "religion must be preserved for the people."

Under these circumstances, Hegel became an idealist. To him the life processes of the human brain, the production and realization of ideas, appeared as the evolution of *The Absolute Idea,* of the absolute mind, which was the real and only ruler of the universe, while the things which the human mind perceived were but unreal imaginations of the Absolute Idea. Of course Hegel had also to analyze Kant's proofs for the existence of a god, as well as the proofs of the metaphysicians and theologians, in order to establish his theory. He made short work of them all by turning them upside down. Kant had declared, that there must be a god, because his existence could not be proven by means of the things which were in this world of human perceptions. Hegel, on the contrary declared, that there must be a

god, because the things of this world had no real existence, and because the Absolute Idea alone was real. And the theologians, on their part, had furnished a third proof for the existence of a god by declaring that he must be there, because the world exists in reality. In short, the human mind, in spite of all scientific progress, was still groping around blindly in the same old contradictory circle. But this maze of contradictions was heralded by the ruling class as the most sublime wisdom, and disseminated by the leaders of thought with the zeal of fanatics. If any proletarian thinker attempted to establish the truth of his theories by such methods, he would be considered a fit companion for the inmates of a lunatic asylum. The most unreal and fantastic ideas were hailed as inspired, and the simplest matter of fact truths assailed as hare-brained imaginations. The classic German school before and after Hegel, represented by men like Schelling, Fichte, and Schopenhauer, never got out of this labyrinth.

In one respect, however, Hegel stands entirely by himself as an idealist philosopher. His is the unique distinction of having elaborated idealism into a complete system of monism, by making his absolute idea the lock and key of all science and philosophy, and thus interpreting the

world and its phenomena from a uniform point of view. It was this monist principle which enabled him to trace the course of history as an evolution and make a dialectic (evolutionary) method of investigation and description familiar to scientists.

It was also his monism which compelled him to take issue with Kant's metaphysical conception of "the thing itself." This metaphysical absurdity did not fit into the frame work of Hegel's monistic system. For the absolute idea was the only all-pervading reality in this system, and everything that appeared in the world was but the work of this idea. In the human mind, the absolute idea became self-conscious. It is evident, therefore, that the idea must know and understand its own nature and that of its emanations, including Kant's unknowable thing itself. And since the human mind was part and parcel of the absolute idea, it, too, must partake of this absolute faculty of understanding and must be able to learn all there is to the thing itself. Now, things reveal their nature by their qualities. Therefore, if all the qualities of a thing were known to us, we should know all that we could ever learn about the thing itself, including the fact that it existed outside of our faculty of thought. But since all

things outside of us, and we ourselves, are but different expressions of the absolute idea, there can be nothing in the world that will remain unknowable to us.

Thinking and being were thus monistically united. But thinking was the only reality in Hegel's philosophy, and being merely an attribute of thought. So the idealist monism of this thinker came to this insoluble contradiction: It tried to prove the reality of the absolute idea by the identity of thinking and being, but the only reliable means by which it could accomplish this was the use of " pure " thought. It had to reject all empirical methods, and rely solely on the power of so-called innate (*a priori*) ideas for the solution of the world's riddles. But innate ideas can operate only with purely introspective philosophy for the solution of all scientific problems. This, however, was contrary to the dialectic (evolutionary) method of research, which compelled Hegel to collect the experienced facts of history. According to this dialectic, the absolute idea developed by a process of evolution in such a way, that every phenomenon begot its own negation, which in turn was followed by a negation of the negation, leading to the reproduction of the original phenomenon on a higher scale. In fact, he

diligently followed the thread of evolution in all fields of science known in his day, and an objective comparison would clearly show that even the so-called great apostle of evolution, Herbert Spencer, walked but in the steps of this encyclopedic idealist monist.

Hegel's dialectic was thus perpetually at war with his system. This was the fatal flaw in his monism. The real and the unreal can never be combined into a system, any more than the something and nothing. The something is real, the nothing is — nothing, is unreal. Being and thinking can be combined only by accepting them as realities. The term " nothing " expresses merely the abstract opposite of an imaginary absolute something. It exists only in thought, it is " pure " thought, which means that it is human imagination misled by false logic. And if this abstract nothing is used as a basis for a system of philosophy, it leads to nothing, in other words, it leaves the human understanding in the wilderness without a guide.

So far as the Hegelian system is concerned, it tells us, therefore, nothing about man, life and their origins, which would improve in any way the work of the ancient Grecian philosophers, the English materialists and the natural philosophers

of the 19th century, such as Treviranus and Lamarck, or which would even indicate the progress made by these men. Nor does it explain the hidden springs of the human faculty of thought. Even a metaphysical thinker like Leibniz, who tried as hard as Spinoza to find a monistic clue to the world, had given a better foundation for the study of this faculty by suggesting that so-called innate ideas might be acquired by the hereditary transmission of ideas derived from experienced perceptions. And those who went back to Kant for an improvement of the Hegelian system, for instance Schopenhauer, landed logically in the swamp of reactionary obscurantism. With all its undeniable brilliancy, Hegelian idealist monism was, therefore, a step away from a scientific understanding of the world.

Not so the Hegelian dialectic. This method developed all the hidden value of the Kantian philosophy. And when the Hegelian system failed, the dialectic survived and prepared, with the downfall of idealist monism, the ascendency and victory of materialistic monism. It is the evolutionary thread, which runs through all of Hegel's writings, that renders a study of his works beneficial for the socialist thinker, who has learned to

cull the evolutionary kernel from the idealist husks.

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XIV. Science and the Working Class

The immediate result of the critical study of Hegelian philosophy in Germany was a fight of the Young-Hegelians against the system of their master. Among these progressive thinkers, the most decisive contribution toward materialist monism was to come from Friedrich Koeppen, Bruno Bauer, Ludwig Feuerbach, Karl Marx and Friedrich Engels.

The strength of Koeppen lay in his understanding of history. The study of the official writers of Prussia had opened his eyes to the unreliability of the academic historians, whose sole sources of information were diplomatic documents and police reports. He made himself conspicuous by a very clever and clear description of the reign of terror in the French revolution, by which he demonstrated his faculty of selecting the most significant and characteristic factors out of a multitude of garbled and intentionally colored traditions. And he distinguished himself favorably

from the mass of the Young-Hegelians by admitting the value of the materialists of the 18th century, although he objected to the "crude materialism" of a Holbach and Helvetius. Koeppen never divested himself fully of the bourgeois psychology, but his historical talent proved to be invaluable to Karl Marx, who was destined to become the first scientific spokesman of the proletarian revolution.

With the development of the German bourgeoisie, and its repression by the feudal nobility, the thinkers of the rising classes felt the need of finding a philosophical expression for their historical condition. In the minds of Bruno Bauer, Koeppen and Marx, this longing for self-expression found vent in a study of self-consciousness. Their starting point was Hegel's analysis of the Grecian philosophy of consciousness, particularly the development of self-consciousness in its relation to social consciousness, in the Sceptics, Epicureans and Stoics. In the Sceptics, self-consciousness had renounced all contact with the world and retreated into itself. The Epicureans had undertaken to show that the principle of individual consciousness was the compelling motive of the universe. The Stoics, finally, had emphasized the interrelation of individual consciousness

with universal consciousness. Hegel had given a philosophically obscure and historically weak presentation of these three schools of Grecian thought, and the idealist nature of his system had impregnated his statements with a good deal of reactionary sentiment. It was natural that his revolutionary disciples should take particular offense at this part of Hegelian philosophy and test its soundness by probing deeper into the problem of Grecian self-consciousness and social consciousness.

The result of their studies was a peculiar contribution on the part of each one of these three Young-Hegelians to the problem of consciousness. Koeppen illustrated the significance of the three above-named Grecian schools by the concrete example of Frederick the Great. Bruno Bauer was led from the study of these three Grecian schools to a study of their influence on the development of primitive Christian consciousness in the Graeco-Roman world. This research bore fruit in the shape of a destructive criticism of the historical value of the four gospels. Bauer struck orthodox theology to the heart by denying that the gospel accounts were based on historical facts and demonstrating conclusively that Christianity arose in the Roman empire as a product of

Grecian philosophy and Roman conditions. But neither Koeppen nor Bauer were able to exert a pregnant influence on the political conditions of their country by means of practical conclusions drawn from their studies.

Marx, on the other hand, probed deeper than his two companions and became an epoch-making historical figure. He first of all set out on a searching analysis of the three significant Grecian schools of thought and studied their connection with the entire Grecian philosophy. He graduated at the University of Berlin with a dissertation on the difference between the philosophy of Demokritos and Epicurus. And he came to the conclusion that his purpose could not consist in anything else but in stating religious and political questions in their self-conscious human form. Religion was the all-absorbing topic in those days of political oppression, and a critique of religion an indirect way of combatting all political reaction. Marx was intimately familiar with the works of Kant and Hegel, and went into a minute study of their proofs for the existence of a God. The comical contradictions in those proofs wrung from him the amused exclamation: " What sort of clients are those, whom their own

lawyer cannot save from execution in any other way than by killing them himself?"

It is out of such considerations as these that Marx felt justified in declaring that religion "is the self-consciousness of a human being that has either not yet found itself or again lost itself. * * * Religion is the sigh of the oppressed creatures, the mind of a heartless world, the spirit of spiritless conditions. It is the opium of the people. * * * The abolition of religion as the illusory happiness of the people signifies their demand for real happiness. * * * The world has long been dreaming of things and has but to become conscious of them in order to possess them. * * * Just as religion is the index of the theoretical struggles of mankind, so the political state is that of its practical struggles. * * *"

The theological opponents of Marx are fond of quoting the first part of these statements in order to prove that "socialism is the enemy of religion," but they are careful to omit the other quotations, which demand that the professed principles of religion should be applied in every day human life.

The religious criticisms of the Young-Hegelians were crowned by Ludwig Feuerbach's "Essence

of Christianity" and "Theses for a Reform of Philosophy," by means of which he emancipated himself and his fellow-radicals from the Hegelian system. He declared point blank: The mystery of God's nature illustrates nothing else but the mystery of human nature. The various proofs for the existence of a God are merely interesting attempts of self-affirmation on the part of the human being. The method of speculative philosophy, which attempts to deduce concrete truths from abstract generalizations, is fallacious. Nothing can be obtained in this manner but a realization of one's own abstractions. The mystery of speculative philosophy finds its logical champion in theology. Hegelian philosophy is the last resort of theology. Whoever does not abandon Hegelian philosophy, does not abandon theology. Being is the true reality, and thinking merely an attribute of being. Being is simply the existence of nature. Empirical philosophy and natural science must go hand in hand.

Theoretically, Feuerbach had thus overcome Hegelian idealism and become a materialist philosopher. But when it came to a practical application of his new understanding to social problems, he balked at the logical progress implied by his advance over Hegel and fell into mean-

ingless ethical generalizations of love. On this field, Hegel himself had gone farther than his revolutionary disciple. Feuerbach overcame the natural and religious idealism of Hegel, but failed to even suspect the meaning of the Hegelian philosophy of state and law. When confronted with the actual problems of social evolution, he was as helpless as the French socialists of the 18th century, who were masters of philosophic criticism, but had nothing constructive to offer save Utopian abstractions.

Marx, on his part, had arrived at an understanding of the deep and significant interrelation between politics and philosophy. In Kant's philosophy, Marx recognized the German theory of the French revolution. And with a fine sense of discrimination, he pointed out the real progress of Hegel over Kant in sociology and history. While Kant had still maintained the distinction between privileged *citizens* of the state and unprivileged *members* of society, Hegel regarded the state as that great organism, in which every human being should realize its legal, moral and political liberty. And the dialectic process, as outlined by Hegel, was praised by Marx as a wonderful advance over the historical blindness of Kant.

Marx, under these circumstances, did not stop at the point where Bauer and Feuerbach had rested in their advance. He pushed ahead without them, and was gradually compelled, by the exigencies of the political situation, to combat them. In the endeavor to better understand the relation of philosophy to politics, he first undertook to submit the Hegelian legal philosophy to his scrutiny, with a view of determining the relation of political freedom to human freedom. He opened his critique with these words: "The criticism of religion ended with the statement that man is for man the highest being. This is equivalent to the categorical imperative to abolish all conditions in which man is a degraded, oppressed, forsaken, despicable being." This requires a political revolution. What are the conditions under which such a revolution can take place? In analyzing this problem, Marx discovered that the conditions for such a revolution had not yet matured in Germany. But at the same time, he answered the question in such a way that it was solved for Germans as well as for all other nationalities.

"In order that the revolution of a nation and the emancipation of a definite class may coincide, in order that one class may be the representative

of the entire nation, it is necessary that all shortcomings of society should be concentrated in another class, * * * so that the emancipation of this class may be equivalent to the emancipation of humanity."

This class is the modern proletariat, recruited mainly from the ranks of the disintegrating middle class and the different strata of the precapitalist working class. This proletariat will find its intellectual weapons in philosophy. "Philosophy cannot be realized without the abolition of the proletariat, the proletariat cannot emancipate itself without realizing philosophy."

This philosophical affirmation of the class struggle was followed by a philosophical synopsis of its historical mission. Bauer had declared that the solution of the "Jewish question" was identical with that of the emancipation of mankind from religion. Marx denied this and pointed out that the question of the relation of religion to politics was different from that of political to human freedom. Even with the greatest amount of political freedom possible in a bourgeois republic, the people might still be enthralled in religious superstitions. Political emancipation is not identical with emancipation from religious dualism. Exceptionally, the struggle for political emanci-

pation may coincide with the struggle for emancipation from religion, as it did during a certain period of the French revolution. But so long as the bourgeoisie is the ruling class, this can occur only by antagonizing the conditions of its own existence, and must, therefore, result sooner or later in a rehabilitation of religion.

Marx was incidentally led to a searching criticism of the natural rights doctrine and found that the so-called inalienable human rights were nothing but an expression of bourgeois individuality resting on an advocacy of private property and individualism. "Not until the real individual man discards the abstract citizen of the state and realizes that he, as an individual, in his actual life, his individual work, his individual relations, is a generic being, not until man has organized his individual powers into social powers, will human emancipation be accomplished."

It was this identical conclusion at which Friedrich Engels had likewise arrived in the meantime, and which he expressed in these words, in a preliminary critique of political economy: "Produce consciously, as human beings, not as separate atoms without any generic consciousness, and you will have overcome all artificial and untenable contradictions!" And with almost the same

words as Marx, Engels summed up his conclusions relative to religion by declaring that "man lost in religion his own nature, divested himself of his manhood. Now that religion has lost its hold on the human mind through historical development, man becomes aware of the void in him and of his lack of support. There is no other salvation for him, if he wishes to regain his manhood, than to thoroughly overcome all religious ideas and return sincerely, not to 'God,' but to himself."

Engels, although not on such intimately personal terms with the historically significant Young-Hegelians as Marx, had likewise taken his departure from Hegel's dialectic. He had then studied Bauer's conception of self-consciousness and Feuerbach's humanitarianism, and pushed on beyond them in search of a fuller understanding of the Grecian natural philosophers. He became aware of the great historical value of the ancient natural philosophy. Realizing that it contained much fantastic by-work, he nevertheless understood that it was the forerunner of a scientific theory of evolution. On the other hand, he did not fall into the mistake of those purely empirical scientists, who snubbed Hegel for his idealism and pretended to have explained

all unknown phenomena by attributing them to some *force* or to some *substance.*

Thanks to this scientific application of dialectic reasoning, at which Engels and Marx arrived independently of one another, they were spared the mistakes of the other Young-Hegelians and the aimless wanderings of the bourgeois scientists and philosophers after them. It was due to the miserable political conditions of Germany that both of them applied their philosophical minds, not to purely academic studies, but to a deeper penetration of the sociological problems which confronted them. Marx took up the study of the French, Engels that of the English socialists. A comprehensive grasp of history, economics, philosophy and natural science was the result. Marx was the first to bring order out of that tangle of blunders known as political economy. Thanks to him, we have a complete survey of the evolution of economics as a science from Aristotle down to Petty, North, Locke, Hume, Adam Smith, Ricardo, and Quesnay.

The central fact, which impressed itself especially on Marx, was that " legal relations and state institutions can neither be understood of themselves, nor as results of the so-called general development of the human mind, but that they are

rooted in those material conditions of life which Hegel, following the example of the English and French of the 18th century, comprises under the name of *bourgeois society;* that, on the other hand, the anatomy of bourgeois society must be sought in political economy." This led him to the logical conclusion that " the mode of production of the material requirements of life determines the general character of the social, political and spiritual processes of life. It is not the consciousness of men that determines their existence, but, on the contrary, their social existence determines their consciousness. At a certain stage of their development, the material forces of production in society come in conflict with the existing relations of production, or, what is but a legal expression for the same thing, with the property relations within which they had been at work heretofore. From forms of development of the forces of production, these relations turn into their fetters. Then follows a period of social revolution."

These are the terms in which Marx formulated his conception of history in his introduction to his " Critique of Political Economy," published in 1859. But when he met Engels in 1845 for the purpose of permanent association with him, he

had it already worked out in almost the same terms. Engels eagerly assented to this new and startling theory of history, which he had himself approached in his "Condition of the Working Class in England in 1844." Henceforth these two thinkers worked side by side in a fraternal co-operation never equaled before or after them. And as the first emphatic declaration of the fact that from now on philosophy, science and the proletariat were united for the conquest of society, and that no science could be monistic without this combination, they flung the gage of battle into the teeth of the bourgeois world in their "Communist Manifesto," published in 1848. Never before had the theory of social evolution been stated in such consistently monist materialist terms as in that immortal document.

Its fundamental proposition, as summed up later on by Engels, is that "in every historical epoch, the prevailing mode of economic production and exchange, and the social organization necessarily following from it, form the basis upon which is built up, and from which alone can be explained, the political and intellectual history of that epoch; that consequently the whole history of mankind, since the dissolution of primitive tribal society, holding land in common owner-

ship, has been a history of class struggles, contests between exploiting and exploited, ruling and oppressed classes; that the history of these class-struggles forms a series of evolution in which, nowadays, a stage has been reached, where the exploited and oppressed class, the proletariat, cannot attain its emancipation from the sway of the exploiting and ruling class, the bourgeoisie, without at the same time, and once for all, emancipating society at large from all exploitation, oppression, class distinctions and class struggles."

The great problem of philosophy, the relation of thinking and being, was thus stated with regard to the human race in a dialectic and monistic way on a materialist basis. For the first time man understood clearly whence ideal forces come and whither they are tending. Human emancipation appeared no longer as the work of some future inspired savior, but as a historical process, whose trend was known and could be controlled by the conscious action of a historically generated class. As Engels stated later in his "Feuerbach": "The realities of the outer world impress themselves upon the brain of man, reflect themselves there, as feelings, thoughts, impulses, volitions, in short as ideal tendencies, and in this form become ideal forces."

The compelling motive for the ideal aims of the proletariat is the class struggle. The evolution of capitalist production determines the form and trend of this class struggle. And the slogan of the revolutionary proletariat is henceforth no longer "Lord help us!" but "Proletarians of all countries, unite!"

In 1848, it was only a small group of proletarians who responded to this cry. The hour for the realization of the proletarian revolution had not yet come. This revolution flared up in a few fitful outbreaks, and then settled down to its logical historical course. But a few far-seeing men welcomed the new message with enthusiasm and devoted themselves to its propagation in the spirit of its authors.

One of the first to realize the importance of the Marxian theories was Ferdinand Lassalle, a German lawyer, who, significantly enough, had also oriented himself first by a study of the Grecian philosophers. He hailed Marx as a "socialist Ricardo and an economist Hegel," and sprang into the political arena of Germany with all the impetuousness of youth, to carry these theories into practice and realize the union between science and the working class. His "Open Letter," written in reply to a request for informa-

tion to a group of German workingmen, led to the organization, on May 23, 1863, at Leipsic, of the "*Allgemeine Deutsche Arbeiterverein*" (General Association of German Workingmen), the nucleus of the International Socialist Party, which is destined to fulfill the mission of the modern proletariat.

When the first proletarian revolts had ended in the supremacy of the capitalist class, and the historical course of capitalist development was fully understood by the proletarian thinkers, they settled down to a careful elaboration of the intellectual weapons of the proletarian advance. The crowning outcome of these labors was that series of writings by Marx and Engels, which became the scientific fundament of the international party of the working class. The foremost of these works is Marx's "Capital," which revolutionized political economy through his theory of surplus-value, bridged the chasm between economics and politics, gave an outline of the past, present and future development of capitalist production, and thus opened an impassable chasm between bourgeois and proletarian science. Its first volume appeared in July, 1867.

It awakened a loud echo in the breast of a German tanner, who had found the way out of

the labyrinth of bourgeois thought independently of Marx and Engels, by self-study. This man was Josef Dietzgen, who wrote to Marx on November 7, 1867: "You have expressed for the first time in a clear, resistless, scientific form what will be from now on the *conscious* tendency of historical development, namely, to subordinate the hitherto blind forces of the process of production to human consciousness."

Dietzgen was a natural philosopher in the true sense of the word. He realized that the Marxian conception of history stated a truth which, in its logical bearing, extended far beyond the sphere of mere social evolution. If the materialist conception of history claimed that material conditions shape human thought, then it was the task of the proletarian thinker to demonstrate, by what means material conditions were converted into human thought. And if this process was a historical evolution, then it devolved upon the proletarian thinker to show by what processes the evolution of the universe resulted in the development of the faculty of human thought and how this instrument of understanding did its work.

Dietzgen, therefore, wrote in the above letter to Marx: "The fundament of all science consists in the understanding of the thinking process.

Thinking means to develop from the material facts, from the concrete, an abstract generalization. The material fact is an indispensable basis of thought. It must be present, before the essence, the general, or abstract, can be found. The understanding of this fact contains the solution of all scientific riddles."

This was, indeed, the crucial point, without which the materialist conception lacked completeness. Without it, the building of materialist monism would have been imperfect. True, Marx and Engels were able to show by the data of history itself that material conditions have always shaped human thought, which resulted in historical events. But not until Dietzgen had shown that the human mind itself was a product of that greater historical process, of which human history is but a small part, the cosmic process, and that the human faculty of thought produced its thoughts by means of the natural environment, was the historical materialism of Marx fully explained and the riddle of the universe solved so far as human thought processes were concerned.

This was done for the first time in Dietzgen's "The Nature of Human Brain Work," published in 1869.

With this work, the socialist philosophy com-

pleted in bold outlines a consistent materialist monist conception of the world, which was uncompromisingly arrayed against all bourgeois philosophy and science, because it rested for its realization on the proletarian revolution. And the test of its monism is found in the fact that none of the shining lights of bourgeois philosophy and science, with the exception of Alfred Russell Wallace, has since worked his way upward to a frank avowal of the historical connection of the proletariat with such a materialist monist conception of the world. We shall presently see that even the clearest thinkers of the bourgeoisie either denied or ignored this connection, or, if its inevitableness dawned upon them, that they bewailed it as auguring the destruction of all "civilization."

But the proletarian thinkers are calmly going their historical way, just as the proletarian revolution is doing. The socialist philosophy, with the founder of scientific socialism, can afford to adopt the motto of Dante: *"Segui il tuo corso, e lascia dir le genti"*— Follow your course, and let the people talk.

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XV. The Offspring of Science and Natural Philosophy

Materialist monism had enabled Marx, Engels, and Dietzgen to find a general key for the solution of all the riddles of the universe by means of inductive reasoning from experienced facts. The conscious and consistent application of this method on the part of Marx and Engels permitted them to realize the general evolution of nature and society by dialectic processes, to make a scientific forecast of industrial and political evolution, and to lay bare the mechanism of social evolution under capitalism by the discovery of the origin of surplus-value and the function of class-struggles. In the hands of Dietzgen, the same method produced a theory of understanding which established harmony between the human mind and the universe and solved all the difficulties, which had been the stumbling blocks of scholastic and metaphysical philosophy for centuries, and which have remained insuperable obstacles for nearly every bourgeois scientist and philosopher until this day.

The vital truth and strength of dialectic materialism was quickly demonstrated by the fact

that this philosophy became the accepted guide of millions of proletarians in all countries, who organized themselves for conscious co-operation in line with evolution. The bourgeois world, ignorant of the historical necessity of this new world-movement and its materialist monist philosophy, continued its heedless and headlong course of individualistic anarchy in thought and action. And when the new movement began to show its power and urge an organization of social life in accord with higher evolution, the bourgeoisie opposed it with might and main as a danger to "law and order."

But the bourgeois scientists more or less consciously carried the method of dialectic materialism gradually into almost every department of their science. In the last half of the 19th century, the Marxian method was frequently plagiarized by bourgeois professors, especially in the field of sociology, economics, and history, with the full knowledge of its original authorship and with the intention of robbing its author of his credit. But not one of the bourgeois plagiarizers or commentators equaled the proletarian masters who had made a new departure in those sciences.

In other sciences, especially in biology, phys-

iology, psychology, physics and chemistry, the combination of the dialectic method with science and natural philosophy led to a universal corroboration of the general conclusions established by Marx, Engels, and Dietzgen. In the course of the 19th century, nearly every science gradually made front against metaphysical dualism and worked its way towards materialist monism. But while the proletarian mind pursued its steady and conscious course along a consistent materialist monist road, the bourgeois mind never succeeded in fully divesting itself of metaphysical relics. Its class-environment proved too great a handicap for a complete emancipation from all vestiges of metaphysics.

In the beginning of the 19th century, the microscope began to exert its influence on philosophy by a succession of discoveries, which enabled scientists to abandon speculation for facts. The beginnings of the cell-theory, established by Grew in his "Anatomy of Plants," and the first description of the cell-nucleus by R. Brown, in the 17th century, now bore unexpected fruits. Schwann and Schleiden showed that all organic structures are built up of cells, and Van Mohl described a certain substance which forms the lining of cells and called it protoplasm. No one

realized as yet, that the essential basis for a mechanical explanation of life had thus been discovered.

But the microscope gave rise to an entirely new science, histology, the study of the microscopical structure of animal and plant tissue. Specialization became more and more an indispensable necessity for thorough research, and with the multiplication of special departments the need of correlation by means of philosophical generalization grew apace. Specialist science and natural philosophy thus became more and more indispensable to one another.

From the study of structure to that of function was the next logical step. Thus dialectics inevitably accompanied the new evolution of things in science.

As soon as this stage had been inaugurated, the battle against metaphysics and the survivals of Mosaic philosophy in natural science began to rage all along the line. Vitalism was compelled to reorganize its lines, even though no consistent theory of vital evolution had then become known. In 1833, Johannes Müller attempted to give a physical basis to this metaphysical theory, by comparing the physical processes in animals and man, in his "Handbook of the Physiology of

Man." But this work was indirectly a proof of the untenability of the vitalist metaphysics. In spite of the dogged resistance of the old theories, the cell and protoplasm made themselves at home in the studies of bourgeois scientists, and produced in Virchow's " Cellular Pathology " a new departure in the study and treatment of diseases.

This was the time of physiological anatomy, and the work of Müller, Brücke, Helmholtz, du Bois-Reymond, and Ludwig in Germany, and of Claude Bernard in France, became the basis on which their pupils in those two countries, and in England, America, Denmark, Sweden, Italy and Japan, built up the structure of modern physiology. In the course of this development, laboratories became a part of every well-equipped school and university.

Chemistry soon took part in this revolution and began to reproduce, by simple laboratory methods, many of the compounds which had been regarded as special products of a supernatural vital energy. Berthelot emphasized the growth of the tendency toward a uniform scientific method of research by declaring in his " Méchanique Chimique," that he intended to " introduce into the entire chemistry the same mechanical principles which al-

ready reign in the various departments of physics."

In 1846, Leverrier and Adams simultaneously and independently of one another discovered the planet Neptune, and thereby reminded the scientists of the vast universe outside of their little specialties. This discovery was a new triumph for empirical science and another blow for revelation and metaphysics. For the existence of this planet had been proclaimed by mathematical astronomy long before it was actually observed by human eyes, and reactionary mysticism had, of course, scoffed at such "daring blasphemy."

Researches concerning the function of electricity, magnetism, and light became more frequent, but led to no definite results until the latter half of the 19th century. In 1864, Clerk-Maxwell announced his electro-magnetic theory of light, but it was not until 1887, that Hertz demonstrated the actual existence of electric waves in the ether. In 1881, J. J. Thompson established the basis of the electro-dynamic theory, and in 1888, William Crookes advocated the theory of the formation of chemical elements from one primordial substance. He spoke of an "infinite number of immeasurably small ultimate — or rather ultimatissimate — particles gradually ac-

creting out of the formless mist and moving with inconceivable velocity in all directions." Thus the 19th century reaffirmed on a more infinitesimal and refined scale the atomic theory of Demokritos.

With the steady progress of this new tendency, Lamarckian ideas gained more and more favor in the eyes of the younger generation of scientists and found two able champions, about the middle of the 19th century, in Alfred R. Wallace and Charles Darwin. In 1859, Darwin's "Origin of Species" carried fresh dismay into the ranks of metaphysics and theology. Here was the irrefutable proof that Lamarck's ideas of descent and heredity were upheld by the facts of nature as occurring before our eyes in animals and plants. And in addition to these irrefutable facts, Darwin laid bare the mechanism by which natural evolution produced the various animal and plant species, which had so long been claimed as special creations. Without any guiding intellect, without any preconceived purpose, by an apparently fortuitous natural selection, which, however, was the product of forces mutually controlling one another, nature was seen to produce its variety of forms by incessant interaction of forces, by a struggle of all organic forms against one another

and their environment, leading to the survival of those which were best equipped for this struggle by superior powers of adaptation to the conditions surrounding them. These produced an offspring well adapted to continue the struggle under the same conditions and in their turn to transmit their qualities to their progeny by means of heredity, while the organisms not well adapted to their conditions of life were eliminated from the line of evolution.

One of the most significant results of this transformist theory was that it wiped out the line of demarcation, not only between the various animal species, but also between animals and plants. In his first work, Darwin had left the question of man's descent open, from considerations of expediency. But when Wallace, Huxley, Haeckel, and others showed that " in every visible character, man differs less from the higher apes than these do from the lower members of the same order," Darwin assented and came forth with his " Descent of Man," in which he indicated the evolution of man and the anthropoid apes from a common man-like ancestor.

Simultaneously with Wallace and Darwin, Herbert Spencer appeared upon the scene, supplementing and perfecting their work by a complete

elaboration of the theory of organic evolution and tracing the struggle for existence through all its manifold aspects. In his "First Principles," he stated the general outline of the universal theory. In his "Principles of Biology," he applied it to the life of organisms. In his "Principles of Psychology," he furnished a comprehensive summary of the results of physiological psychology. And in his "Principles of Sociology," he presented the relations of this theory, as he understood it, to human society, activity, and ideas in general. Although we are far from agreeing with Spencer on all points, as we shall presently show, we have no hesitation in saying that Spencer's works rank as high in the evolution of materialism, as Hegel's do in idealism. The "Synthetic Philosophy" will always hold its place among the great works of the world.

In Darwin, Wallace, and Spencer, dialectic materialism erected on English soil a landmark of its progress over speculative idealism. Although the dogmatism and bigotry of the entire reactionary world united in a furious assault upon their work, not one of their fundamental stones in the structure of evolution was injured by the attack. Metaphysics and theology had no weap-

ons with which to defeat their materialist antagonist in open battle.

Vainly did Agassiz try to save personal creation and fixed species by his " Essay on Classification." Vainly did the most reactionary of churches set its learned men to work forging arguments against Lamarckian, Darwinian, and Spencerian transformism. Instead of defeating the new ideas, even the Jesuit scientists that had not quite degenerated in spiritual obesity from lack of exercise of their reason became gradually " tainted " with transformist ideas, and finally the church itself sanctioned the greater part of the new ideas as divine creations and, as usual, sought to ruin by adoption what it could not conquer by force. And the palaeontological work of Agassiz himself compelled him to proclaim the fact of progressive changes in the organisms of each successive geological epoch.

By tracing the descent of man below the primates, the question of the evolution of man was not fully solved. It was merely stated in its correct form, and science could not rest satisfied and regard the Darwinian theories as proven, until it had located the transition forms between the common primeval ancestor of man and anthropoid apes and then followed the line of

evolution as far back through the lower animals as human faculties would permit. It was palaeontology, embryology, comparative physiology, and histology that became the most convincing witnesses for the mechanical origin and development of organisms. In the Neanderthal man, the Spy man, the Krapina man, and the Pithecanthropus of Trinil, palaeontology supplied one by one the missing links between man, the anthropoid apes, and their primitive common ancestor. At the same time, it gathered the proofs of the existence of similar types in the Tertiary age. Haeckel formulated his biogenetic law, which revealed the fact that individual development is a condensed repetition of the race development, and that the embryos and newborn individuals resemble their ancestral types more closely than the adult parents. Then came Behring with his discovery that blood serum of horses treated with poison of diphtheria bacilli was an antidote and preventive of diphtheria, and Uhlenhuth found that blood transfusion furnished an infallible test for the close or remote relationship of animals. Uhlenhuth, Wassermann, Stern, Friedenthal, and Nuttall continued these experiments and proved the blood relationship of man and the anthropoid apes.

In therapeutics and pathology, similar experiments led to the introduction, by Koch, Pasteur, and others, of serous treatment, and the advance of chemistry supplied anaesthetics for surgical operations and robbed pain of its victims.

Comparative physiology, assisted by the biogenetic law and palaeontology, gradually traced the evolution of man from the common ancestor of man and primates down through some primitive species of lemurs (night monkeys), thence on through marsupials, duckbills, saurians, fishes, to ascidians. Then Haeckel advanced his gastrula theory and divided the lowest organisms into unicellular protozoa and protophyta, and multicellular metazoa and metaphyta, bringing the descent of man down to some primordial common protist ancestor of animals and plants.

In Haeckel's " New History of Creation " and Bœlsche's " Evolution of Man," the whole thread of evolution from the unicellular protoplasm to modern man is outlined so plainly, that we can follow it from natural specimen to natural specimen and convince ourselves by a visit to any well-equipped museum of natural history of the reality of this outline.

In the sixties, Kirchhoff and Bunsen discovered spectral analysis and thus furnished science

with another revolutionary instrument, by which the unity of the farthest fixed star with the rest of the universe was irrefutably demonstrated. Ethnology, anthropology, and the comparative study of languages clearly established the unity of the human race. Natural science dominated all human thought and even found its way into political history in Buckle's "History of Civilization."

Once that the unity of all organisms in the world had been established, two questions immediately required an answer. One of them concerned the unity of psychological phenomena, the other that of life.

If the physiological development of mankind, animals, and plants knows no line of demarcation, but only degrees of organization, and if psychology is in reality a branch of physiology, why should there be a line of demarcation between the psychological development of man, animals, and plants? And if all organisms are descended from some common primordial protoplasmatic form, then the discovery of the origin of the vital processes of that form, or of any form, would solve the question of all organic life in the universe.

The answer of science to both questions was

positive. Romanes, Haeckel, and Jacques Loeb accumulated superabundant proofs for the physiological nature of the "soul" and the fundamental unity of the "soul" life of all organisms. The line of demarcation was gradually wiped out between mankind, animals, and plants, also in psychology.

Romanes, in his "Mental Evolution of Animals and Man," pictured the growth of the "soul" from primitive beginnings to its present superb organization in the brain and nerve system of man. Haeckel in his "Soul Cells and Cell-Souls," demonstrated that the fundamental conditions of "soul" life were contained in every cell, whether it was a human, animal, or plant cell. And Loeb showed convincingly that so-called intelligent or instinctive action does not depend on a supernatural, or even natural, center of orientation or control, but on chemical and physical interactions between the environment and the individual. The attraction toward the earth (geotropism), toward the light (heliotropism), toward solid bodies (stereotropism), and similar movements, in connection with electricity, magnetism, radiation, and chemico-physical changes in the organism, explained all the intricate "soul" processes formerly attributed

to supernatural intelligence or animal instinct. Hereditary transmission by means of simple natural processes in connection with use or disuse, produced the faculty of conscious memory in the higher organisms and led by imperceptible stages of gradation to the superior mind of man. The primitive line of psychic development has been outlined in popular language in Francé's "Germs of Mind in Plants."

The quest after the origin of life compelled science to penetrate far beyond so-called living organisms. It led on into the inorganic, and wiped out the line of demarcation between organic and inorganic, living and dead matter. It showed that organic life arose through the mechanical evolution of inorganic life. It revealed that life and death are but two poles of the same universe, that the distinction can no longer be between life and death, but only between different degrees of organization and intensity of life, between positive and negative life.

Personal immortality now resolves itself into personal evolution. Life and consciousness are now revealed as attributes of all matter, going through as many different stages of evolution as the various material forms in the universe. The personal immortality of any definite form would

involve the control of all evolutionary processes which endanger the persistence of that form. So long as such a control is not established, there is a "transmigration of the soul," but not in the way that the mystics use this term. The physiological processes of a certain positive consciousness, or "soul," are converted by the process of "death," into negative consciousness, which in turn becomes the positive consciousness of some other form.

With Haeckel and Jacques Loeb, a school of biologists has arisen, which marks a new stage in the revolution of the ideas concerning life and consciousness. This school has made the first steps toward a conscious control of the processes of life and consciousness, and the question of the control of these processes is within measurable distance of solution by means of laboratory methods. Loeb's works on tropisms and his "Comparative Physiology of the Brain and Comparative Psychology" are indispensable textbooks for every sincere student of materialist monism.

Other sciences have likewise gone far on the road toward a conscious control of universal processes. Liebig's commercial chemistry inaugurated the realization of Berthelot's dream,

who looked forward to a time when all human food stuffs would be prepared in the laboratory and the drudgery of industrial and agricultural labor eliminated. A new impetus was given to electric vacuum work in 1893–95 by the publication in Germany of the results of experiments made by Lenard and Röntgen, showing that certain rays of light, invisible to the human eye, penetrated substances, which had been considered impenetrable for light of any kind, and affected photographic plates. And in 1896, Becquerel, experimenting in France with phenomena of phosphorescence, showed that salts of uranium emit radiations which penetrate opaque bodies, affect photographic plates, and discharge an electrometer. Following close upon Becquerel's discoveries came the brilliant work of Mr. and Mrs. Curie on the radio-activity of bodies accompanying uranium (radium and helium).

Edison's phonograph, Marconi's and Tesla's experiments with wireless telegraphy, liquid air, the transmission of power by means of waterfalls or tides of the oceans, sun-motors, airships, color-photography, the ultra-microscope, and similar discoveries and inventions, augur an impending revolution in methods of industrial activity, reducing the element of distance to a

minimum, transforming manual labor into a superintendence of machines, and narrowing the domain of disease and death. Everywhere we see the coming of that conscious control of elements which Marx has foretold.

But here, where natural science touches elbows with social science, even the clearest of the bourgeois thinkers bears evidence to the force of environment by falling short of a complete monistic conception of evolution. For such a conception foreshadows the abolition of the ruling classes and the control of society by the working class. Even the most encyclopedic mind among the bourgeois transformists, the avatar of evolution, as he has been called, Herbert Spencer, admitted but grudgingly that the evolution of society tended inevitably toward socialism. And so enveloped was he in the prejudices of bourgeois individualism, in spite of his understanding of the trend toward socialization, in spite of the eloquent language of dialectic evolution which through his own mouth heralded the conscious interrelation of things, that he completely misapprehended the effects of the socialization and democratization of industry and bemoaned the sad fate of humanity under the " coming slavery." In ethics, his bourgeois horizon likewise did not

permit him to arrive at a dialectic solution. He could not reconcile his biological and social ethics with his idea of the coming slavery.

The same criticism applies to Hæckel, who in many respects equals Spencer in his conception of evolution. Haeckel's monism is not free from class bias and metaphysical vestiges. He interpreted the struggle for existence with regard to man as an aristocratic principle, resulting in the selection of "the best," and declared that the "crazy ideas" of the socialists had nothing to do with Darwinism. Forty years of socialist literature and activity in Germany have made little change in his opinions on this point. He has never realized that the struggle of man against nature is accompanied by the struggle of economic classes, and that the modern class-struggle between the working class and the capitalist class is a democratic principle, resulting in the organization of a new social environment, in which the struggle of classes shall be eliminated, and man unite all his social and individual forces for the struggle against nature. In his ethics he is as vague as Spencer, unable to reconcile his biological understanding of the physical basis of ethics with his views on sociology.

The logical result of this class bias is that

notwithstanding all the efforts of Haeckel and others to establish a perfect monism, they are unable to escape from the contradictions inherent in the historical myopia of the bourgeoisie. Haeckel's works on monism, such as the "Riddle of the Universe," "Monism," or "The Wonders of Life," are sadly disfigured by sudden relapses into metaphysical language and thought. The same incongruities also vitiate the scientific discussions of bourgeois Darwinians, whenever the subject calls for an understanding of the dialectic nature of evolution, more especially for an understanding of the peculiar nature of the human faculty of thought. The discussion of the continuity of the germ plasm and the transmission of hereditary characters by natural selection through the sole agency of this plasm in multicellular organisms, as advocated by Weismann, or of the mutation theory of De Vries, who tries to explain the sudden appearance of new varieties by the peculiar laws of crossing, would have produced far better results, if the bourgeois scientists could have agreed on a consistent understanding of "natural selection," and if they could have risen sufficiently above their environment to grasp the full significance of materialist monism as revealed by Dietzgen's theory of understand-

ing. As it is, they onesidedly emphasize now this, now that, forgetting the wider interrelations of their subject, and this little shortcoming defeats all their efforts to disentangle themselves from the difficulties of their semi-metaphysical mode of reasoning. The tangle in the details of Darwinism and Spencerianism will not be straightened out, until a socialist Darwinian will bring order out of this chaos, as Marx did out of bourgeois political economy.

This bourgeois handicap becomes especially apparent, whenever the practical application of scientific understanding comes into conflict with the business organization of bourgeois society. A drastic illustration of this fact is furnished by the attempt to reform the department of criminology and introduce evolutionary methods into the treatment of the insane. When the revolution in psychology demanded a revision of the ideas concerning the free will and personal responsibility of criminals, the bourgeois criminologists made vain efforts to bring their criminal codes into accord with the new facts without undermining their own juridical foundation. This became especially plain in Italy, where the ideas of Beccaria acted as a ferment and led to the rise of the so-called positive school of criminology,

in the last quarter of the 19th century. Carrara, Pessina, and even Lombroso, strove vainly to overcome bourgeois environment by radical bourgeois criminology. They did not get farther away from medieval methods and mass emprisonment than an imitation of the American system of solitary confinement would permit, with its corollary of sham justice. And they gave up in despair the attempt to find the dividing line between conscious and unconscious action, between completed and incompleted crime. It was not until Lombroso's disciple, Enrico Ferri, found his way into the field of historical materialism and socialism, that the positive school of criminology was enabled to teach a monistic and evolutionary solution for the vexed question of social crime, by demanding the social prevention of crime instead of police repression. But Ferri does not indulge in any illusions as to the revolutionary role which the bourgeoisie may play in this question. He understands that the evolution into socialism is the only means of realizing his demand. His "Socialism and Criminality" and "Socialism and Modern Science" are gems of dialectic and monistic materialism.

It is a significant fact that not one of the numerous textbooks on psychology written by

bourgeois professors for the use of universities takes frankly issue with the metaphysical rubbish of pseudo-science and espouses uncompromisingly the cause of materialist monism. And this is so for the same reason that no bourgeois professor teaches the Marxian theory of surplus-value and accepts its logical conclusions. The same reason prevents bourgeois Darwinians from accepting the facts of socialism. Darwin was at least honest enough to admit that he had not studied sociology and did not consider himself competent to judge of the merits of Marx's "Capital." But the modern Darwinians are not so modest. They ridicule the socialist philosophy before they have studied it. On the other hand, every socialist writer of note is a convinced Darwinian and Spencerian besides being a convinced Marxian. For this reason, the socialist Darwinians are alone able to reason in a consistent materialist monist way.

When, in 1877, Lewis H. Morgan appeared with his main work, "Ancient Society," in which he demonstrated the blindness of his predecessors, Bachofen and McLennan, in the field of anthropology and disclosed the true nature of the primitive sexual organizations, it was the socialist Engels who rescued Morgan's work

from oblivion and applied the new discoveries of Morgan concerning these primitive "gentes" with telling effect to further historical research. In Engels' "The Origin of the Family, Private Property, and the State," the connection between the dissolution of the primitive sex-organizations and the rise of private ownership of the essential means of production was laid bare, and the origin of the modern state as a result of this process clearly proven. And the socialist Cunow, in his "Sex-Organizations of Australian Aborigines," supplemented and perfected Morgan's work by additional studies.

Again, when bourgeois female emancipation started its planless crusade and hoped for the support of the equally planless bourgeois science, it was the socialist Bebel, who in his "Women in the Past, Present, and Future," demonstrated the weakness of bourgeois science and reminded bourgeois women that female emancipation was a process of evolution and could be accomplished only through the proletarian class-struggle.

And finally, when the bourgeois psychologists kept turning around their own axis in the vain endeavor to find a monistic formulation for the new psychological facts, it was the socialist Engels, who in his "Anti-Dühring" showed that

the dialectic process pervaded society and nature, and the socialist Josef Dietzgen, who in his 'Outcome of Philosophy" perfected his materialist monism by demonstrating that the universe is an organism and the infinite cause and effect of everything, including itself and the human faculty of thought, or "soul."

But bourgeois minds will as soon accept the socialist philosophy as a camel will go through a needle's eye, or a rich man go to jail. So the bourgeois science gropes along as best it may in its half-hearted monism which is not monism, continues the fruitless discussion of semi-metaphysical *functions, forces, or faculties,* and leaves much room for the speculations of pseudo-scientific occultism. With *functions, forces, and faculties,* all manner of miracles are performed by spiritualists, mental scientists, theosophists, and other votaries of the mystic. But what do these terms signify? What is, for instance, the faculty (function, force) of thought?

Labor is a function of labor-power. Labor-power is the latent (potential) energy of the human body, and it performs its function by converting this potential energy into kinetic energy, or motion. Quite analogically, thinking is a function of the faculty of thought. This fac-

ulty is the labor-power of the human brain, the latent energy of the protoplasmatic system of the human body. The brain performs its function by converting its latent energy into motion, or thought, in response to all the stimuli sent to it by way of the protoplasmatic system. This function is a labyrinth of objective reactions and subjective counter-reactions. It is all this as a part of the entire natural universe, and it is nothing else. The difference between conscious and unconscious, or subconscious, thought is purely one of the intensity of stimuli and reaction. And when physio-chemical biology will have analyzed this labyrinth of processes, traced its fundamental reactions in the laboratory, and connected them with the final source of all, the universe, man will know all that his faculty of thought can find out about itself and other riddles of the universe.

This conception of the universe and of the human soul is diametrically opposed to metaphysical and theological dualism. Truly does Haeckel cry out: "An honest and objective observation of these obvious antagonisms makes their reconciliation impossible. Either an understanding of nature and experience, or the fables of belief and revelation!"

But a scientific theory of understanding includes the recognition of the socialist philosophy. And the only element which is consciously striving for the realization of this philosophy is the class-conscious proletariat of the world.

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XVI. A Waif and Its Adoption

With the establishment of the facts of universal evolution, bourgeois science had accomplished something which did not only far surpass the narrow demands of business interests, but which also became a serious annoyance and danger to the ruling classes. True, most of the bourgeois scientists vehemently denied that social evolution partook of those tendencies of universal evolution which were claimed for it by proletarian thinkers. It is continually denied to this day that the results of modern science are opposed to theological religion and class rule. But the facts acknowledged by the bourgeois scientists as irrefutable were sufficiently revolutionary to call forth violent protests from bourgeois and feudal politicians, and to set theological philosophers at work writing long-winded treatises try-

ing to reconcile science and dogmatic revelation.

These ostentatiously legitimate protests were at once re-enforced by a flood of personal abuse and rancorous vilification, an art in which especially the theological harbingers of love and peace have shown themselves as adepts. Men like Darwin, Haeckel, Loeb, found out what sort of a highly refined intellectuality the intimate acquaintance with theology or bourgeois culture produced in their adversaries. One has only to turn over a few leaves of some of the so-called refutations of Haeckel's works, written by Jesuit and other confessional "scientists," in order to get as pretty a collection of low billingsgate as may be found anywhere in the vernacular of that other product of bourgeois rule, the city slums.

Bourgeois science is thus perpetually at war with bourgeois intelligence, and university professors have learned to their bitter disappointment that freedom of science is little respected when it runs counter to freedom of trade. It is no wonder that many a bourgeois scientist, shirking the ordeal of want in old age, has revoked the scientific convictions of a lifetime and prostituted his better self for the flesh pots of bourgeois Egypt.

Under these circumstances, the proletariat can-

not place any reliance on bourgeois science. It must and will maintain a critical attitude toward all bourgeois science, and accept nothing that does not stand the test of proletarian standards.

So far as bourgeois science coincides with the findings of proletarian science, we shall gladly accept and foster every truth, and we shall do it so much more gladly, when that truth is rejected by bourgeois self-interest and combatted for reactionary purposes. But we shall on our part reject everything which tends to strengthen the ruling class, endanger the progress of the proletarian revolution, or interfere with the advance of human knowledge and control of natural forces in general. Bourgeois science, so far as it exceeds the demands of bourgeois society, is a waif abandoned by its own mother, and will be gladly adopted and nursed to vigorous life by proletarian science.

It is natural that with the growth of the socialist movement much reactionary bourgeois thought is carried into it by newcomers from the bourgeois intellectual camp. This thought at once takes issue with the advanced proletarian mind and, with the modesty typical of the bourgeoisie, proceeds to instruct the proletarian thinker and pull him back from his outpost. Un-

compromising and frank discussion is the only method used in return by socialists the world over in their endeavor to ascertain the truth and keep their movement in line with natural evolution. We welcome such discussion and neither expect nor give any quarter.

The materialist part of the socialist philosophy meets with strong disapproval from two camps within its ranks. Neither of them is numerically very strong at present, but they may become so when larger bodies of the intellectual middle class will ally themselves with the revolutionary proletariat. One of these camps favors speculative metaphysics, the other christian socialism. Both of them object to the consistent application of the materialist conception of history and the universe on the part of the strict Marxian school.

They urge against materialist monism that their ethics are superior to or identical with those of socialism, and out of this alleged superiority or identity they construct an argument in favor of speculative idealism or theological religion.

That ethics do not rest on idealism or religion has been proven by thousands of years of human history. We do not base our ethics on our philosophy, nor our philosophy on our ethics, but regard both ethics and philosophy as results of

material environment, as we have sufficiently shown in the preceding pages. Therefore we first of all object to this confusion of the issue.

In the second place, we demand that both speculative philosophy and theological religion shall stand or fall on their merits, just as materialist monism is expected to do.

The science of the 20th century has grown tired of operating with half-defined terms and hypotheses. These are more and more discarded for the study of movements. The discussion of mere terms and definitions has developed into an effort to arrive at a clear understanding of processes for the purpose of controlling them. Vainly do the obsolete methods of research and dogma attempt to adjust themselves to the new conditions.

Vitalism dreams of saving itself by becoming Neo-Vitalism, Idealism has donned the robes of Neo-Kantianism, both of them trying to play Hamlet with Hamlet left out. Metaphysics is becoming a mere metaphor for a vague agnosticism. Even theological religion is making a desperate effort to escape the inevitable by masquerading as "true" religion.

But their powers of adaptation are gone.

They are strangers to dialectic reasoning, and the old style of argument no longer holds.

But their champions fail to realize this. Arguments that have been chewed *ad nauseam* for fifteen centuries are still supposed to satisfy a mind acquainted with the weightiest facts against them.

Mosaic revelation had adjusted itself as best it could to its earlier defeats. When the travelers and navigators demonstrated to every unbiased brain's satisfaction that orthodoxy's inspired men were ignorant of geography, the advocates of the theological creation theories mumbled confused excuses about the "divine intention" to limit human understanding, until it should please God to grant us more wisdom. When it was shown by the astronomers, that revelation had been mistaken in considering the earth as the center of the universe and the sun as a terrestrial satellite, the same stale excuse was haled forth, after the most vindictive and narrow-minded opposition had proven ineffective against the new facts. Then the theologians readjusted their revelation to suit this advance of the human mind, made in the face of their resistance. When science began to establish the fact of the mechanical origin of the universe, and

threw the theological creator out of his own creation, it seemed that the Mosaic conception of the universe had reached the limits of its adaptation. But Kant, who had been most instrumental in defeating it, did his best to save it, and theology grasped eagerly at the Kantian straws. Then Lamarck and Darwin came along and demonstrated that species were not individual creations, but forms of evolution. Orthodoxy first had the same stereotyped answer ready and then transformed the Mosaic god into a god of modern evolution. Then it was found that life itself was a product of cosmic evolution. There was no other refuge left for the theological creator but man's supposed supernatural "soul." This, at least, theology said, was a creation of God. But Haeckel, Dietzgen, and Loeb have swept the last theological cobwebs out of this hiding place by identifying the human soul with the evolutionary processes of the material universe.

Nevertheless, orthodoxy in the disguise of metaphysics and "true" religion, continues to dodge around in the old way, to rest on its unproven assertions as though they had been established by the most painstaking and irrefutable work of science, to sneer at the results

of the scientific accumulation of facts which every one can verify without the help of any authority, and to raise the cry of sacrilege at every attempt to criticise without bias and without malevolent intent the tenets of the believers in mystic creeds.

But the time has come when this method is resented as an insult to intelligence and manhood. Orthodoxy must submit to the same criticisms which all other things in the universe must sustain. More still, it must henceforth bring better proofs than bare assertions, if it would survive. The cry that we are "attacking religion" when we are simply investigating its claims, will no longer avail. And it is time to hurl the accusation back at those who hide behind it and who have always been the first to attack the most objective and mild criticism with a flood of abuse and misrepresentation.

Unless the metaphysical idealists bring better proofs than heretofore in justification of their insistent claims that the proletariat must "go back to Kant" for more knowledge, we shall decline the invitation and ask: "What is there in Kant to go back for?" Dietzgen went back to Kant, but only to show the absurdity of the mystic conception of the "thing itself" and to excel Hegel in this respect by stating the ques-

tion correctly and solving it. Laplace excelled Kant in a consistent loyalty to scientific principles in cosmogeny. Hegel surpassed him in historical perception and comprehensive grasp of evolution. Marx and Engels eclipsed Hegel in dialectics, setting up a new standard for the study of history. And Dietzgen rounded out the work of Marx and Engels by a consistent monist conception of the universe. What else is there in Kant that has not been outdone?

"His ethics," cry the Neo-Kantians, "his sublime ethics!" Let us see. In the "Neue Zeit," XXII, vol. I, No. 20, Franz Mehring writes that the sublimity of Kant's ethics "is of the kind which constitutes a step toward the ridiculous. Nowhere is Kant so pronounced a philistine as in his ethics, and at that a philistine in whose veins all the bad blood of theology is circulating. His ethics with its categorical imperative is nothing but the Mosaic decalogue, and his doctrine of the radical evil of human nature nothing but the dogma of inherited sin. So far from having assisted in the baptism of the New Testament, Kant's ethics simply harked back to the Old Testament. Goethe, who indeed looked with sceptical eyes upon Kantian dualism, expressed the opinion that Kant had miserably soiled his

clean philosopher's clothes by his doctrine of the 'radical evil,' and even Schiller, the enthusiastic Kantian, ridiculed the genuine philistine spleen, according to which not he was acting virtuously, who from motives of compassion assisted his fellow-beings — because he was only following his own impulse — but rather, e. g., a miser who at the dictation of the categorical imperative very reluctantly offers charity. . . . Even Schopenhauer, who proclaimed himself as the genuine and true heir to Kant's throne — and justly so in many respects — rebelled against Kant's ethics. On Kant's rule, 'The sentiment which commands man to obey the moral law is that it should be obeyed as a duty, not from voluntary choice or without being ordered,' Schopenhauer commented with the fitting remark, 'it must be ordered. What slave morals!' And these slave morals are to be grafted into the proletarian fight for emancipation!"

Of course there is a germ of truth even in this Kantian idea of doing that which requires individual self-compulsion. The individual must adapt himself to his environment, on penalty of being eliminated from the line of forward evolution by natural selection. An understanding of the facts of evolution serves, therefore, as a

categorical imperative for the individual to control reactionary impulses and keep his acts in line with the social evolution of his class and the cosmic evolution of his race. Whoever acts in accord with these, acts virtuously. This is a universal standard easily intelligible to every one, for a moderate observation of our bodily and mental condition will quickly reveal, whether we are acting against our physical and intellectual evolution, and the class-struggle continually reminds us of the right course of our class, which leads to the reconciliation of our class interests with the general evolution of humanity as a whole. But the first requirement for such an understanding is the rebellion against metaphysical dualism. It is a complete breach with Kant's philosophy, not a return to it.

There is little consolation for our Neo-Kantian exhorters in this reply, but it is the truth. Kant accomplished enough for the historical conditions of his time, and his work in cosmogeny will be an everlasting credit to his name. But when we are told that the modern proletariat must go back to him for its philosophy, we smile as we would if we were told that the butterfly must go back into its chrysalis.

So far as ethics are concerned, this answer

fits also the christian socialist objectors to materialist monism. To any one versed in the dialectic mode of reasoning it would also be a sufficient refutation of the claims of christian theology on the proletarian revolution. But dialectic logic is not one of the virtues of christian socialists, and especially in the United States they are conspicuous by their lack of positive scientific knowledge and their abundance of "divine wisdom." It will therefore be necessary to devote a little more thought to them.

Among some christian socialists in this country, where christian socialism is not, as a rule, opposed to the proletarian revolution as it is overwhelmingly in Europe, the idea is propagated that the coming of socialism will mean a revival of "true" religion. But if we ask them what they mean by true religion, we get a medley of vague replies which differ more or less according to individual idiosyncrasies.

According to materialist monism, the only "true religion" is the "religion" of Natural Truth. And this truth is not to be sought in the unknowable and impossible nothing called the supernatural. It is contained in the physical and chemical elements in us and around us. And it can be found with the natural means which every

human being has received by nature, the five senses, and the brain, which is the organ of the sixth sense of mankind. Without the help of these, nothing can be learned, for without them there is no human consciousness, no human "soul."

But this "true religion" of Natural Truth never came to conscious life, until it found its monistic expression in the minds of the thinkers of proletarian socialism. A thing that never lived before the modern proletariat generated it cannot be "revived" by its victory. It can only be brought to full life by it. As for any religion based on mystical beliefs, it will not be revived, any more than the Mosaic ideas of geography and astronomy. It will be defeated by the overwhelming and ever growing control of the human mind over the other parts of nature. To the extent that science compels nature to yield one of its mysteries after another, the basis of mystical religion and authoritative revelation disintegrates, and the science of life comes into its own.

It is often denied that theological religion is a matter of belief upon authorities. It is claimed that it is rather a matter of belief upon "a revealed word and the spiritual experience of the

soul." The dualist conception of "spiritual" and "soul" in this statement has already been appreciated at its real value in the preceding lines. As for the "revealed word," to whom was it revealed? Moses, the prophets, the editors of the christian gospels who wrote from two to three hundred years after the death of the first christian revolutionaries some contradictory records which they claimed were the revealed word of Christ and his disciples, were human beings like the rest of us, but with less positive knowledge of themselves and the world. The same is true of the other alleged founders of other mystical theologies. They asked their contemporaries to believe upon their self-interested assertion, that they had received some "divine revelation" by some miraculous "spiritual experience" of their individual "soul." They had no other proofs for the truth of their assertions but so-called miracles which we are told by others they performed. A proletarian who to-day believes their assertions, or those of their unthinking followers, all of whom were either members of the ruling class or mentally controlled by them, surrenders his intellectual or "spiritual" life into the hands of his enemies. Revelation must either come to each human being individually, and in

that case each individual must experience the same "spiritual" miracle that others claim to have experienced, and we do not need any spiritual authorities and their alleged miracles. Or, revelation can come only to the select, and then all the rest of humanity must take their "spiritual" beliefs upon the authority of others.

If individual "spiritual" experience is to be the test, then materialist monism acknowledges only one revelation. That is the revelation of nature, the communication between the natural parts of the universe by means of their natural elements. This is accessible to all without regard to race, color, or station. It will come to all who diligently seek for it. "Seek and ye shall find." That is the only "true religion and revelation" of all mankind.

It might be objected that even materialist monism admits that the human mind can never fully exhaust the universe, and that therefore it can never know everything that is in it. But in the first place, this leaves room only for natural unknown things, not for any supernatural agencies. In the second place, even if it permitted the theory of the supernatural, the burden of the proof for the existence of supernatural agencies would still be upon those who

believe in them. The fact that we might not be able to demonstrate that such agencies do not exist would not relieve them of this burden. But the assertions hitherto offered by them are not proofs. In the third place, the difference between that which we can know compared to that which we cannot know is not so great, that it can defeat our endeavor to control the material forces of the universe.

It is true that man as organized to-day can see only that which is visible for him, hear only what is audible for him, taste only that which his tongue can discriminate, feel only that which his touch can bring to his notice, smell only that which his olfactory organs can detect, think only that which is thinkable for his brain, and know only that which is knowable to this brain under such circumstances. But in the first place, the human brain will not always remain organized as it is to-day. A comparison of the construction and volume of the skulls of a Pithecanthropus, a Neanderthal man, an Australian aborigine, and an educated Caucasian, is so convincing, that the development of a vastly higher organ of understanding out of the human mind, in the course of further millions of years, becomes a logical demand of materialist monism.

Of course, even this higher organ of understanding will be limited by its organization and cannot penetrate beyond that by any other means but further evolution. Yet it will perceive and understand a great deal more than ours.

Furthermore, all things of the universe have developed from a few basic elements, which we cannot divide beyond the limits of human perception. These basic elements do not seem to have changed their fundamental nature in all the millions of years since organic life began its evolutionary course. At least we have no means of determining any changes in them, although they too, go through an evolution along with the different forms which they have generated, as is shown by radium and helium. But evidently the elements have so far had a greater affinity for reaction toward their type than toward new variations, in other words, the evolution of the forms generated by them proceeds faster than that of the elements themselves. These evolutionary forms have naturally a greater tendency towards variation than their basic elements.

The logical conclusion from these premises is that the development of that higher organ

of understanding which will follow the human mind, and which will, of course, be as much a part of nature as we are, will gradually diminish the difference between the absolutely unknowable and the relatively knowable. Mathematically speaking, the absolutely unknowable will become infinitely smaller, the relatively knowable will become infinitely greater, until the lines between the unknowable and the knowable become imperceptible.

This conception does not leave the least room for any metaphysical explanation of anything that we may not know. It leaves no room for any supernatural ghosts or "spirits."

That which theologians conceitedly call their "spiritual" experience, and which according to them no "atheist" can have, is a mixture of vague feeling and self-suggestion. They suggest to themselves that their indistinct, and to them supernaturally mysterious, feeling of the infinity of the natural universe is a "divine revelation," and then they claim to have received it by supernatural agencies. And when they are shaken out of their self-hypnotism and asked to show proofs for their assertions, they retire gracefully behind that other bare assertion, that this cannot be proven by any process of reason-

ing, but must be believed upon the testimony of individual "spiritual" experience. That is but a mystic way of saying that no man can believe a thought unless he makes himself believe it. But when theologians are driven to this extremity, they get mad, tell us that their belief is sacred to them, and that they do not care to discuss the matter any further. They want to continue their hypnotic slumber and are mad at being shaken out of it.

But nothing is sacred before the tribunal of Natural Truth. Everything has to prove its right to existence before this tribunal by natural processes of reasoning, or stand convicted as an imposture. By crawling behind the excuse that this or that is sacred to them, the theologians and their unreasoning herd merely acknowledge their mental poverty and their lack of historical understanding. And they stand before the throne of Natural Truth as self-convicted impostors, who deceive themselves and others and bar the progress of the human mind to an understanding of itself and of the universe.

As a last clincher, we sometimes hear the defiant assertion that wise men generally "do not understand the word of God." That is what the ruling classes have hurled in the face of all revo-

lutionary thinkers since the betrayal of the christian revolution, and it is certainly not calculated to increase our confidence in christian socialists who repeat it against the revolutionary thought of the very class whose ideals they claim to champion.

They may flatter themselves that they can force the churches of the ruling classes to surrender to the christian socialist interpretation of the gospels and enact those teachings which were a part of the revolutionary message of the ancient christian proletariat. They might as well expect that the bourgeoisie should carry out the principles of the natural rights doctrine. It would be ridiculous to lose any more words about such a lack of historical understanding.

Another argument of christian socialism is that the materialist standpoint prejudices christian working men against socialism. If this means anything, it means that we should suppress our better knowledge and prostitute a known natural truth to some petty tactical utility. That would certainly be neither "christian" in the sense of christian socialism, nor reconcilable with the ethics of the proletarian revolution.

Of course, it is not necessary that every member of the socialist parties should endorse the full

conclusions of the socialist philosophy. For these conclusions reach far beyond the present and future requirements of party activity. But this cannot prevent us from making use of our right of free speech within and without the party for the mutual education of ourselves and others by means of free discussion of vitally human problems. On the contrary, it is one of our greatest duties to make use of this right and guard it against reactionary attempts to stifle the free word in the interest of some "sacred" hallucination.

Materialist monism is not "atheism." The atheist is distinctly a product of class rule and will die out with bourgeois culture. Atheism is simply mental anarchy, a reflex of the industrial and political anarchy in the "spiritual" world. It is the bare negation of supernatural gods, without any recognition of the constructive tendencies of evolution, and its historical place is in the museum of antiquities by the side of the mechanical materialism of the 18th and 19th centuries, where the christian theologies will in due time also find a quiet resting place. The fact that materialist monism has no god does not make it identical with atheism any more than the fact that christianity believes in a supernat-

ural god makes it identical with paganism. Only an ignoramus can dismiss materialist monism with the supercilious and flippant term of "atheism."

In stating the historical truth that the modern proletarian revolution is inseparably linked with the growth of materialist monism we do not imply that the victory of socialism depends on the spread of "atheism," or even of materialist monism. On the contrary, we are simply stating a fact revealed by the materialist conception of history, namely, that the industrial and political revolution produces a mental revolution. This mental revolution strikes not only at the economic and political institutions, but also at the ideas of the ruling classes.

Class rule is inseparably united to mysticism and theological religion. And if the declining bourgeois world feels the need of a "spiritual revival" in the sense that they long for a return of the good times when they swung the rod over the mental life of the working class, we can understand their feelings very well and sympathize with them. But we are not going to fulfill their wishes in this respect.

To the extent that class rule totters, the proletarian mind rises out of the fog of mystic phi-

losophy or theological religion into the bright sunlight of materialist monism.

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XVII. Materialist Monism, the Science and "Religion" of the Proletariat

The world-process is an evolution through revolutions. Its course appears to the monist understanding of the present day as a parabolic curve, coming out of the unknown infinity of nature and leading into its eternal future.

In the dim past, where the world-process becomes perceptible to human understanding, we see an infinite mass of infinitesimally minute ether dust whirling about in all directions. Here is life with all its attributes in the earliest and most primitive form conceivable to monist reason. Consciousness and will are among these attributes in the germ, just as are electricity, magnetism, radiation, or such abstract qualities of the abstract *matter* of abstract school philosophy as indestructibility and impenetrability.

This picture shows all there is in the universe at that inconceivably remote stage of its career. This is the cosmos, god, infinite, or whatever

high name you wish to give it, that created itself out of itself, that has no beginning and no end, that has no other universe outside of itself, that is omnipotent, omniscient, and above all omni-natural. All these terms mainly prove the limited scope of the human understanding as at present organized.

The evolution of this infinite ether-universe, this great nothing which is everything, follows its own laws. And the general law pervading all evolution is this: The positive life of a certain stage generates within itself the elements of its own negation. At a certain period determined by the pace of evolution, these negative elements come into irreconcilable conflict with the old positive conditions. Then follows a period of revolution, which is cosmic, geological, meteorological, biological, psychic, economic, or political, as the case may be. The new negative forces finally dominate the old positive ones and transform them into negative ones to conform with the others. By this means the negative become the positive elements of a new cycle of evolution. They generate in their turn the elements of their own negation, which in due time bring about the negation of the previous negation by a new revolution. This results in the domination of the

new negation as the positive force of the next cycle, continuing evolution on a higher scale.

This is the eternal law, and it is fulfilled as strictly in the most minute particle of ether as it is in the physical molecule, the chemical atom, the individual crystal, plant, animal, or man, the globe of the earth, the sun, a fixed star, or the entire universe.

In fulfillment of this law, a part of the primitive ether-universe is gradually converted into more condensed particles which assume by degrees certain mathematical forms. In response to physico-chemical tropisms, they congregate here and separate there. Out of the universal whirl, more condensed whirls gradually loom up and arrange themselves in accord with new laws which develop to the extent that this movement makes progress.

Æons pass, and the whirls have become worlds in primitive stages of formation. By the process of further condensation and rotation, heat is generated, marking a new revolution and the introduction of new formations. Gradually the fundamental chemical elements of the universe as we know them develop, and the glowing spheres circle through the ether, distancing in their evolution the slow processes of the old ether-uni-

verse. Still this old universe persists in its infinity, and the new worlds are but islands in its boundless extension. It reacts on the new world-processes and assists in their further condensation.

Æons pass before the physico-chemical reactions have accumulated sufficient precipitations of solid and fluid matter on the earth to form a durable mineral shell with pools of water and an atmosphere. Other aeons pass before the first organic life rises out of the reactions of the inorganic under favorable conditions. But when these conditions are at last mature, the revolution of the organic against the inorganic generates the first protists. These separate in the course of ages into unicellular plants (protophyta) and unicellular animals (protozoa).

The inorganic environment continues to change, and, through the interaction of organic and inorganic life-processes, the simple monera without a cell-nucleus are transformed into algaria with a cell-nucleus and a cell-membrane. After the first division of labor between inside and outside protoplasm has taken place, other specializations of the interior and exterior structure follow in due time.

Along with this development comes association

of unicellular organisms into little cell-clusters, and the division of labor arising under the new environment produces the first multicellular animals, the gastræades. These repeat on a higher plane the primitive division of labor of the protozoa, producing the skin-and-stomach type of the gastrula, which represents the first rudimentary plan of connective tissue and internal organs. The unicellular plants have in the meantime accomplished similar results.

No sooner has this stage become fairly established, than a new division of labor is inaugurated. So long as the cell lives independently, it propagates by fission or gemmation. But in the multicellular community, fission is a nuisance. Gemmation permits of modifications which do not disturb the communal life. So each cell in the community transmits its share of sexual life to special sex-cells, and in the further selection of these the male and female organs arise, leading to the climax of separation of sexes in individuals. Some still retain the old form of common sexuality, but the new mode of propagation proves superior in spite of its apparent slowness and complexity, because it furnishes a greater variety of new material for natural selection.

At this stage, the ether-universe is filled with spheres in various stages of development. Natural selection continues its work in them as it does in the surface and the interior of the earth. Vast oceans and marshes cover the surface of the terrestrial globe at this stage, and in the depths of the water myriads of plant and animal organisms from the lowest types to advanced worms are disporting themselves. These organisms are all of them endowed with the essential faculties of consciousness and will. But this consciousness is as yet little above that of the primitive inorganic life out of which it evolved. These forms have no brain, although some of them have developed the rudiments of a nerve system.

Long before the Silurian period, we find in those oceans certain worms which have developed a chorda, the first piece of cartilage indicating the beginning of a thing which will in course of time become the backbone of vertebrate animals. Other worms continue without a chorda and give rise to a separate line of invertebrate evolution.

The earth and its oceans change. In the transition from the pre-Silurian to the Silurian period, we meet with the ancestors of the modern Amphioxus, a little headless fish that has improved

on the chorda of its worm ancestors and whose tiny string of spinal nerves *above* the chorda indicates a new feature which from now on becomes the characteristic mark of all vertebrates.

During the last stages of the transition toward the Silurian period, worm-like fishes appear with a better developed chorda, a more highly organized nerve system, and the rudiments of a skull with brains. The spinal chord above the chorda is becoming the halfway house between a brain and a complicated nerve system.

The selachian and ganoid fishes of the Silurian period have developed the chorda into a cartilage backbone and skeleton, their brain is much better organized, and they have acquired the definite beginnings of that system of five fingers or toes on four limbs, which we see later as a typical mark of the highest vertebrates.

Ages pass and accumulated changes in the earth's crust and surface bring on the Devonian period. Dry land has been lifted out of the oceans, and some fishes have been compelled to live for months with little or no water. They have developed their airbladder into a lung and their forefins into strong supports for walking, climbing and digging. Their cartilage skeleton has become bony. The decisive step has been

made for the transfer of some vertebrate life from the water to the dry land and to the open air.

Another terrestrial age passes away, and the surface of the earth has become fully ripe for organic life on land. The plant has wandered ashore even faster than the animal. A miraculous transformation has taken place since the departure of the nebulous whirl of the earth from the ether-universe, which still extends its inexhaustible infinity all around the circling spheres. The Carboniferous and Permian periods abound in the amphibian successors of the lungfishes and in the reptilian followers of the amphibians. The brain, the nerve system, the finger system, the skeleton, have made further progress.

From fishes to reptiles, the foundation has been securely laid for the earthly supremacy of animals with brains, nerves, lungs, and bones. The higher evolution of these things by natural selection through use in the struggle for adaptation is assured.

Now the line of evolution comes once more to a parting of the ways. Among fishes, amphibia, and reptiles, there are exceptional cases of a development of the forelegs into wings, and of propagation by the birth of living young ones,

instead of the hatching of eggs. Now some reptiles develop these wings still more, retaining at the same time propagation by means of eggs. Other reptiles spend their surplus-energy in the development of a new method of propagation and evolve a placenta in the womb of the female. Again the brain, nerves, finger system, and bones are affected accordingly.

Wings prove after all of less value in the further evolution than a placenta. With the development of the sex-system of the mammalia, the nerve and brain systems are far more directly and profoundly affected than they are by the comparatively slight modification of lizard wings and scales into bird wings and feathers. The internal adaptation is the more valuable. Thanks to it the mammals rise superior to the birds and the other animals. The mammalian brain, nerve, and finger systems outstrip those of the birds, and at the end of the Secondary period, the brain and its accompanying marks of evolution have arrived at the highest type of man-ape.

With the terrestrial changes of the Tertiary period, the man-ape becomes an ape-man with erect body, greater brain volume, and better hands and feet. The further accentuation of these factors results in the birth of man. The

new race proves to be especially well fitted for survival and in the course of the Tertiary period, spreads over vast areas of the earth's surface and conquers its animal life.

Great geological catastrophes follow. The Ice-Age overtakes the organic life of half the earth. Man, having learned the use of fire, drives the ferocious beasts out of their caves and survives even here. Great floods surprise many of the human beings when the ice melts. Yet the race survives and spreads, growing in brain volume and skill of fingers. They have learned to think connectedly and to speak articulate languages. Their environment determines the character of their social organization.

In one respect, all the early social groups of mankind are alike: They are all rooted in sexual kinships, and descent is traced by the female line. The rules of mutual intercourse growing out of these relations are democratic and dictated by direct observation of the evil effects of violating natural laws of adaptation and sexual selection. Nature itself teaches primitive man to observe the laws of evolution. All ideas of modern altruism, morality, love, liberty, brotherhood, and the like, are etherealized and dete-

riorated copies of natural practices of primitive man.

From savagery through barbarism to patriarchy, the primitive organizations of man learn the first rudiments of the art of controlling nature. Brain and hands unite to bring forth tools and shelter by which to increase human power and comfort. The wilderness of plant and animal life succumbs step by step to man's superior powers, and as his powers grow, his nature moves away from the brute and his thoughts turn toward higher evolution by means of still greater control over nature.

But with the increase of food, clothing, and shelter, and the consequent multiplication of the human sex group to a point where it becomes unwieldy, the old natural relationships are undermined. The human understanding is not mature enough to consciously create better adapted relationships. So, while the old relations gradually dissolve, new and unknown ones arise and carry strife and disorder into the harmony of the ancient family life. To the extent that this process continues, the common resources of life are appropriated by the most cunning or prominent man in each group, the women are excluded from the common privileges,

and gradually the women and the majority of men become economically dependent on those who have profited from the disintegration of the old groups and made themselves masters of the formerly common requirements of life. Female descent gives way to male lineage in the interest of inheritance of private property.

Thus "civilization" comes in by a suppression of the fundamental condition of all social morality and right, the common ownership of the earth, of its products, and of the tools socially acquired by the evolution and co-operation of countless generations. Individualism and anarchy now take the place of the spirit of community and natural order. New economic and political forces grow up, which baffle all attempts of man to control them, because he obstinately declines to demolish the soil out of which they grow, the private ownership of the earth and of social wealth.

Economic usurpation begets wars for territorial expansion and slavery of prisoners of war. Slavery begets more wealth and leads to the introduction of a coercive power, the state, which gradually overawes not only the captives, but also the poor members of the same tribe. Political privileges are reserved

for the wealthy, local division into groups regardless of descent takes the place of organization by sex-groups (gentes), and exploitation of fellow-gentiles comes gradually in the place of slavery, when slaves are no longer profitable.

With the transformation of fellow-gentiles into rulers and ruled, the old natural laws of moral relationship are transformed into a code of oppressive law. The primitive worship of overwhelming forces of nature is transformed into a supernatural religion, which institutes a ruler in heaven after the model of the rulers below. Just as economic and political fetters prevent the rise of the lowly to social freedom, so mental fetters now prevent the rise of their minds out of intellectual oppression. This condition is defended by the rulers as the best on earth, and their religious teachers derive out of this degradation the consolation of spiritual salvation after death.

Feudalism, the successor of slavery, keeps the majority of mankind in this condition, until new economic forces burst serfdom asunder and instal the capitalist class as the new rulers, who derive out of their economic supremacy the same justification as former rulers for keeping the reason of mankind, including their own, enthralled in lies and ignorance.

But capitalism, like all other things in the universe, also begets its own negation. The modern working class, the negative force of capitalist society, but the positive force of evolution at this stage, abolishes the profit-system, transforms the capitalists into workers, and makes itself the positive force of the new social organization.

The negation of the capitalist class and the domination of the proletariat as the new positive force is at the same time the final negation of all class-struggles, so that conscious co-operation becomes the new law in social evolution and natural selection operates under radically changed social conditions.

But the abolition of class-struggles is not the negation of the struggle for existence against the forces of nature. Conscious human co-operation in the struggle against nature merely inaugurates a new cycle of cosmic evolution. This cycle cannot end in the abolition of the universal struggle, because the universe, being infinite, always generates the elements for new negations. Yet each new negation henceforth implies the improved co-operation of human beings in the control of evolutionary processes. For when the proletariat as a class awakes to class-consciousness, humanity to that extent awakes to world

and cosmic consciousness, realizes its mission in society, on earth, and in the universe, and consciously prepares the means for the accomplishment of this mission. That is the tremendous difference between the proletarian and all other social revolutions, that it understands the course of social and cosmic evolution and adapts its action to this understanding, while all other social revolutions were carried through without this understanding. With the proletarian revolution, the highest organ of consciousness evolved by the universal process of transformation takes the first steps for a premeditated and scientific control of the entire process.

The function of the human understanding is henceforth not so much to maintain itself in its present organization, but rather to control those processes which will promote the negation of its present organization and its evolution into a higher one. It is not to strive for reactionary immortality in its present form, not to preserve its identity of to-day beyond the point where it interferes with its identity of to-morrow, but merely to insure its normal evolution into to-morrow's identity. This alone is the way toward immortality, and the individual cannot hope to

lead the way towards it without the conscious evolutionary organization of society.

Along with the understanding of social and cosmic evolution comes naturally an understanding of individual and sexual evolution. Just as the new social ethics demand a conscious adaptation of social activity to a normal process of cosmic evolution, so the new individual ethics demand a conscious promotion of the natural selection of qualities which will be of most value in social and cosmic evolution.

Reaction and progress are struggling in each individual the same as they are in every particle of the universe. Naturally this struggle is reflected in the individual consciousness, or "soul." Every one of us therefore feels two natures struggling within him. The one drives him forward, prompts him to do the things which will develop evolutionary qualities in himself and others. The other nature suggests thoughts and actions which arrest evolution and create disease, suffering, unhappiness.

It becomes, therefore, an imperative duty of materialist monism to warn mankind against intimate relations between reactionary and evolutionary individuals. Whether any one will give heed to the voice of reaction or of evolution, de-

pends in the last analysis on heredity and environment. It is well, therefore, to learn early in life whether one's nature, and that of friends or dearer comrades, tends more toward evolution or toward reaction, and whether proper treatment will result in the victory of evolution. Otherwise there is no secure basis for future happiness.

An evolutionary ethic demands the abolition of all economic, political, and intellectual oppression; a reduction of the struggle for the material requirements of life to a minimum by a collective control of productive processes; an understanding of cosmic, social, and individual evolution; sexual selection of evolutionary natures; and a control of self in accord with the requirements of universal evolution through the fulfillment of the preceding conditions.

Those who violate these demands are eliminated from the line of evolution by natural selection; those who fulfill them are blessed with eternal salvation through nature.

All finite things can survive in the universal transformation only by conforming to this universal "moral law." Individual immortality of the human consciousness, as to-day organized, is a reactionary idea. The narrow path of eternal

life leads only through the golden gate of adaptation to the understood line of evolution.

Only the universe is immortal, and it cannot be destroyed. If the human mind wishes to share in this immortality, and avoid being hurled into the abyss of oblivion, it has only one course open before it: The conscious promotion of an environment in which an organ of understanding can develop which will succeed in controlling the universal process.

It is only the philosophy of the proletariat which furnishes a scientific basis for the realization of the most daring dreams of the thinkers of all ages. The proletarian mind, conscious of its origin, its present and future place in society and universe, its social, terrestrial, and cosmic mission, can exclaim triumphantly: "I was, I am, and I shall be!"

GLOSSARY

IN WHICH THE AUTHOR EXPLAINS HIS CONCEPTION OF SOME OF THE SCIENTIFIC TERMS USED IN THIS BOOK.

(*n. means noun, adj. means adjective.*)

BIOLOGY, n., the science of life processes.

BIOLOGICAL, adj., pertaining to biology.

BOURGEOIS, n., a member of the bourgeoisie.

BOURGEOIS, adj., pertaining to the bourgeoisie.

BOURGEOISIE, n., originally the well-to-do middle class of modern capitalism, nowadays applied to the modern capitalist class in general.

DIALECTIC, adj., pertaining to dialectics.

DIALECTICS, n., a method of expression which aims to portray the natural movement in the universe.

DUALISM, n., a conception of the universe as composed of natural and supernatural parts.

EVOLUTION, n., a continuous natural transformation by the interaction of antagonistic movements, resulting in the natural selection of progressive forms.

HEGELIAN DIALECTICS, n., a conception of the universal process as a movement of positive

and negative forces, the credit for which is due to the German idealist philosopher Hegel.

HISTORICAL MATERIALISM, n., a method of research established by the socialist Karl Marx, conceiving of human history as a dialectic process based on economic changes.

IDEALISM, n., a theory distinguished from idealist monism by a vague conception of the functions of the universe as supernatural, without a just appreciation of its physical structure and development.

IDEALIST MONISM, n., a uniform conception of the universe as a supernatural organism.

MARXISM, n., the foundation of scientific socialism, established by Karl Marx, based on his theories of surplus-value, historical materialism, and social evolution through class-struggles.

MATERIALISM, n., a theory distinguished from materialist monism by a crude emphasis on the physical structure of the universe, without a just appreciation of its functions and development.

MATERIALIST MONISM, n., a uniform conception of the universe as a natural organism.

METAPHYSICS, n., the science of the mental as distinguished from the physical life; on account of its historical origin, it is dualistic and opposed to materialist monism, although it pretends to be opposed to idealist speculation.

MONISM, n., a uniform conception of the universe.

PALÆONTOLOGY, n., the science of extinct animals.

PHYSIOLOGY, n., the science of the physical properties of animals and plants.

PROLETARIAN, n., a member of the proletariat.

PROLETARIAN, adj., pertaining to the proletariat.

PROLETARIAT, n., a class of human beings in class societies having no other means of existence but the use of their labor-power in the service of the ruling classes. The modern proletariat, in the strict meaning of the term, is the class of industrial wage workers.

PSYCHOLOGY, n., the science of the processes of the "soul," or "mind."